

APPENDICES

ENERGY ENGINEERING ANALYSIS PROGRAM

LIMITED ENERGY STUDY

FORT HUNTER-LIGGETT, CALIFORNIA 1993

VOLUME II

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PREPARED BY

KELLER & GANNON ENGINEERS • ARCHITECTS 1453 MISSION STREET, SAN FRANCISCO, CA 94013 19971016 255

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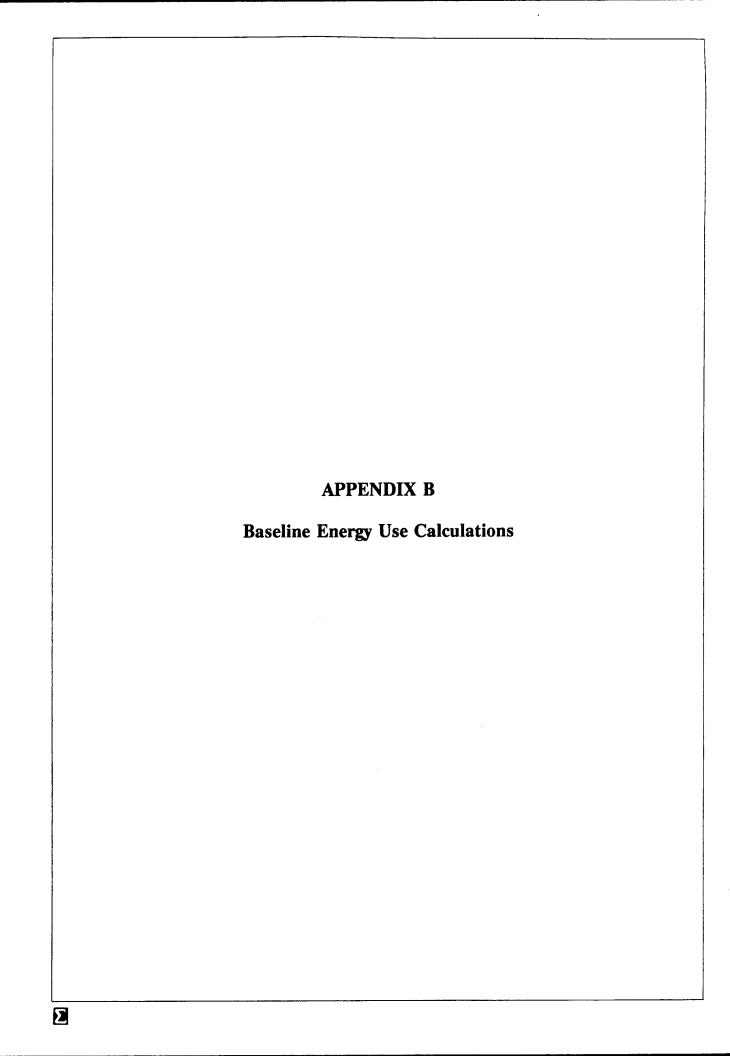
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Methodology

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APPENDIX B

BASELINE ENERGY USE CALCULATIONS

B.1 Methodology

Energy consumption in selected existing buildings is determined for various categories of end-use separately for fuel oil, propane and for electric power consumption. Categories of energy end-use and tables where results are summarized include:

- Heating, Table B-2
- Cooling, Table B-2
- Ventilation, Table B-2
- Domestic Hot Water, Table B-2
- Lighting, Table B-3
- Process, Table B-3

Existing conditions for baseline energy use are determined based on field data using computer simulations, standard engineering calculations and empirical information developed from similar investigations. The results are tabulated and compared to available consumption records. Results of building energy use calculations are summarized on Table B-1.

Procedures used to determine energy consumption for each of the above categories are addressed below.

B.2 Space Heating, Cooling, and Ventilation Energy Use

Heating, cooling, auxiliary equipment, and ventilation energy uses are determined using the computer simulation program: Trane Air Conditioning Economics (TRACE) 600.

The TRACE 600 program is used on buildings as identified on Table B-4. This program calculates hour-by-hour loads for each zone.

Results of building simulations are shown on Table B-2.

Manual calculations are used to determine energy use for the remaining buildings evaluated. HVAC energy use is calculated based on results of TRACE 600 runs on similar buildings, fuel and electric power consumption records and on manual calculations of block loads considering the weather data developed in Appendix C.

Data for simulation programs and manual calculations are taken from the available information contained in:

- Building survey notes (see Appendix F).
- Available building plans, copies of which were made during site visits.
- Interviews with Directorate of Engineering and Housing personnel.
- Building information schedules and fuel use records and efficiency measurements.

Although Tables B-1 and B-2 show only the baseline HVAC energy use for each building, buildings are resimulated and evaluated with changed conditions for analyses of various energy conservation opportunities (ECO's). Refer to Appendix D for ECO calculations.

B.2.1 Heating Energy Use

Heating energy used to serve heating loads is recorded as fuel oil, propane and/or as electricity use. These entries correspond to energy consumed by boilers (fuel only) and/or by electric resistance heaters and heat pumps.

The efficiencies of heating equipment used to determine energy use are based on measurements and observations made during building surveys. Results are shown on Table B-5 for heating system fired equipment. Equipment is described in Appendix F.

B.2.2 <u>Cooling Energy Use</u>

Cooling energy use is summarized on Table B-2. Only electricity use is recorded because there are no absorption cooling devices in the EEAP buildings. The coefficients of performance (COP) used are based on measurements of operating cooling equipment and on manufacturer's data. Cooling system data is tabulated in Appendix F.

B.2.3 Auxiliary and Ventilation Equipment Energy Use

Electricity use for auxiliary and ventilating equipment is indicated on Table B-4. This equipment includes such items as boiler burner blowers, fuel pumps, air handlers and condenser fans, circulation pumps, etc. Energy use estimates are based on the operating characteristics of the various heating and cooling equipment. Operating schedules for buildings and their mechanical systems as well as the types and sizes of equipment are based on observations made during building surveys.

B.3 Domestic Hot Water Energy Usage

Energy consumption for heating domestic hot water (DHW) is a function of:

- Per capita consumption of DHW (gallons per person per day, GPCD)
- Actual temperature of DHW
- Temperature of the water supply
- Domestic hot water heating system efficiency

Table B-6 is a summary of per capita consumption data used for calculating DWH usage. This information has been developed based on guidance referenced in the table.

Domestic hot water heating system efficiencies are shown on Table B-7. Where both electric and fuel oil-fired systems are installed, the portion of the load that each system satisfies is indicated.

Temperatures used for determining existing energy consumption were measured during field investigations.

In accordance with Fort Ord Regulation 11-2, and authorized DHW temperatures, temperatures measured during field investigations are listed in Appendix C and are shown in print-outs associated with ECO C-1 Reduce Domestic Hot Water Temperatures. (See Appendix D)

The water supply temperature is assumed to be 60 degrees F during the summer and 50 degrees F during winter. An average of 55 degrees F is used in calculations.

Baseline domestic hot water energy consumption calculations appear on Table B-8.

Domestic hot water energy consumption for multiple use buildings are determined by considering occupancies and temperatures of component uses separately.

Piping and tank thermal losses are calculated separately and tabulated in Table B-8. Tank and piping loss calculations appear later in this Appendix.

B.4 Lighting Energy Consumption

Lighting energy consumption is broken down into the following categories for reporting purposes:

- Interior Lighting
- Exterior Lighting

Lighting energy usage is summarized on Table B-3. Detailed calculations appear on Table B-9.

The methodology used in calculating lighting energy use is addressed later in this Appendix. Lighting fixture type data is summarized in Appendix F.

B.5 Process Energy Usage

Process energy is any energy use which is not included under space heating, cooling, or ventilation, domestic hot water (DHW) heating (including DHW used in dining facilities and clubs) or lighting systems.

Process energy uses are determined for each type of building function. Factors are developed based on detailed considerations and metering of process energy use in several similar projects. Factors are summarized later in this Appendix. Process energy calculations are shown on Table B-10.

Most process energy consumption involves electric powered equipment and systems such as: ice machines, water coolers, vending machines, office equipment, coffee pots, televisions, other small appliances and shop equipment.

Energy usage rates for various building functions are summarized and explained later in this Appendix.

B.6 Estimated Energy Use Versus Recorded Energy Use

Estimates of energy uses for Fort Hunter-Liggett (FHL) buildings and exterior lighting systems are compared to records of FY92 fuel consumption and power generation on Table B-11. Use of the most recent complete year of energy use records for checking estimates requires fewer adjustments to account for demolitions and newly constructed facilities.

Tables B-1 through B-3 summarize results of estimated energy use for:

- Heating, ventilating and air conditioning (HVAC)
- Domestic hot water heating
- Lighting (interior and exterior)
- Process energy use

Fuel oil, propane and electricity use are addressed separately. Deliveries of fuel oil and propane to FHL buildings are compared to estimates for fuel oil using buildings on Table B-11. As can be seen, all estimates are close to 10 percent of fuel deliveries.

No records are available for fuel oil deliveries to individual buildings. Recorded consumption is based on DEH trips to fill all tanks. Propane delivery records for

individual buildings are available only for the period between 6 November 1991 and 31 August 1992. These records were normalized to a full year based on ratios of 65 degree F-based Heating Degree Hours for the periods of record and no-record.

Electric power metering is not available on a building-by-building basis. Thus, totals of estimated electricity use are compared to power plant records for each site on Table B-10. Results indicate that estimated electricity use agrees with records for FY87.

Baseline energy use calculations are, thus, validated for use as the basis from which energy conservation opportunities are evaluated. Estimated energy use is a little lower than the records indicate for all energy types. A low estimate provides for conservative analysis of energy saving opportunities.

TABLE B-1 SUMMARY BASELINE ENERGY USE

Fac	Facility	Area	Total Base	eline Energ	y Use	Energy pe	er Floor SF
No.	Name	(SF)	Fuel Oil	Propane	Electric	Total	HVAC
			MBTU/Yr	MBTU/Yr	KWH/Yr	MBTU/Yr	kBTU/SFYr
Т 6	Family Housing NCO & Enl	1,090		113	14,938	163	150.0
P 41A	Family Housing NCO & Enl	1,397		60	21,587	134	95.8
P 41B	Family Housing NCO & Enl	1,937		.43	10,130	78	40.1
P 42A	Family Housing NCO & Enl	1,937		ස	23,442	143	· 73.8
P 42B	Family Housing NCO & Enl	1,937		43	10,130	78	40.1
P 43A	Family Housing NCO & Enl	1,937		63	23,442	143	73.8
P 43B	Family Housing NCO & Enl	1,937		43	10,130	78	40.1
P 44A	Family Housing NCO & Enl	1,937		63	23,442	143	73.8
P 44B	Family Housing NCO & Enl	1,937		43	10,130	78	40.1
P 45A	Family Housing NCO & Enl	1,937		63	23,442	143	73.8
P 45B	Family Housing NCO & Enl	1,937		43	10,130	78	40.1
P 46	Family Housing CG & WO	2,089		59	18,710	123	58.9
P 47	Family Housing CG & WO	2,089		59	18,710	123	58.9
P 51A	Family Housing NCO & Enl	1,937		63	23,442	143	73.8
P 51B	Family Housing NCO & Enl	1,937		43	10,130	78	40.1
P 52A	Family Housing NCO & Enl	1,937		63	23,442	143	73.8
P 52B	Family Housing NCO & Enl	1,937		43	10,130	78	40.1
P 53	Family Housing CG & WO	2,089		57	18,710	121	57.9
P 54	Family Housing CG & WO	2,089		57	18,710	121	57.9
P 55	Family Housing CG & WO	2,089		57	18,710	121	57.9
P 56	Family Housing CG & WO	2,089		57	18,710	121	57.9
P 57	Family Housing CG & WO	2,089		57	18,710	121	57.9
P 58	Family Housing CG & WO	2,089		57	18,710	121	57.9
P 59	Family Housing CG & WO	2,089		57	18,710	121	57.9
P 60	Family Housing CG & WO	2,089		57	18,710	121	57.9
S 79	Post Office, Main	1,000			4,028	14	13.7
P 80	Exchange, Main Retail	9,093		148	157,389	685	75.4
P 81	Theater with Dressing Rm's	6,719		150	55,915	341	50.7
P 101	Open Din Cons (Hacienda)	6,171		1,452	235,466	2,256	101.6
	Club (Bar)	3,046					
	Hacienda, East Rooms	4,721					
	Hacienda, West Rooms	8,273		٥٣	7.450		90.0
1 1	Exchange Service Station	1,126		35	7,153	59	33.2
	(Non-shop areas)	662		040	177.017	GE A	
i .	Fire Station - Office	3,636		948	177,017	654	58.2
	Fire Station - Dorm	2,653					
	Fire Station - Garage	4,949			04.004	070	07.0
T 121	Bowling Center	4,952 628		98	81,291	376	67.3
T 124	Family Housing LC & MJ	2,001		309	25,187	395	197.5
	Officers Quarters Military	2,250	 	320	15,729	374	166.1
	Officers Quarters Military	20,196		2,013	335,214	3,157	156.3
	Family Housing CG & WO	998		107	14,095	155	155.4
S 144	Gymnasium	7,172		53	6,909	76	10.6
> 1 71	Gymnasium	1,116			0,503	70	10.0

TABLE B-1 SUMMARY BASELINE ENERGY USE

Fac	Facility	Area	Total Base	eline Energy	/ Use	Energy pe	r Floor SF
No.	Name	(SF)	Fuel Oil	Propane	Electric	Total	HVAC
		` ,	MBTU/Yr	MBTU/Yr	KWH/Yr	MBTU/Yr	kBTU/SFYr
S 146	FE Facility	4,042		256	9,369	288	71.2
T 149	Family Housing NCO & Enl	1,196		203	14,692	254	212.1
T 156	FE Facility - Shop	1,753			12,187	42	18.5
	FE Facility - Office	497					
T 158	Vehicle Storage	1,859			50	0.2	0.1
T 161	Admin General Purpose	2,250		83	16,557	140	62.1
T 162	Elec Maint. Shop	2,250		83	11,902	124	55.1
T 163	Officers Quarters Military	2,250		83	9,253	115	51.0
T 164	Admin General Purpose	2,250		83	12,977	128	56.7
T 165	Admin General Purpose	2,250		83	12,977	128	56.7
T 166	Officers Quarters Military	2,250		83	9,253	115	51.0
T 167	Officers Quarters Military	2,250		83	9,253	115	51.0
S 168	General Purp Warehouse	6,560			178	1	0.1
T 172	Cold Storage Warehouse	800			22	0	0.1
P 177	Technical Library	3,599		23	33,700	138	38.3
P 178	Child Development Cntr	3,599		143	47,537	305	84.8
S 182	Commissary	3,000		51	207,050	758	252.7
S 186	Sup Svc Admin Bldg	1,920		120	21,635	193	100.7
P 190	Post Chapel	2,720	310		45,185	464	170.7
S 197	Admin Bldg R&D - Office	2,100		268	119,544	676	82.8
	Admin Bldg R&D - Electronics	6,062			ŕ		
S 198	General Inst Bldg	1,090		49	5,304	67	61.6
P 205	Admin General Purpose	35,820	1,952		431,110	3,423	83.5
P 205A	Company HQ Building	5,161	,		•	<u> </u>	
P 206	Enlisted Pers Dining Fac	16,768	4,851		336,665	6,000	357.8
	Kitchen Area - Scullery	,	,				
P 207	Enl Barracks w/o Dining	35,820	2,420		420,291	3,855	94.1
P 207A	Company HQ Building	5,161			·		
P 208	Enl Barracks w/o Dining	35,820	2,443		426,427	3,898	95.1
P 208A	Company HQ Building	5,161	'			,	
P 209	AAFES Snack Bar	3,320		92	248,311	939	282.9
P 210	HIth/Dntl Clinic w/ Beds	10,973	3,048		320,937	4,144	377.6
P 211	Outdoor Swimming Pool	-		1,211	36,436	1,335	-
	Gymnasium	8,907		1,094	90,714	1,404	157.6
P 219	Physical Fitness Center	3,212		500	46,441	659	205.0
P 229	Enl Barracks w/o Dining	40,915	2,079		418,400	3,507	76.1
P 229A	Company HQ Building	5,161		ļ	•		
P 230	Enl Barracks w/o Dining	35,820	2,324		428,922	3,788	92.4
P 230A	Company HQ Building	5,161	'				1
S 235	Admin General Purpose	3,000		46	32,302	157	52.2
S 236	Admin General Purpose	3,000		47	32,302	157	52.4
S 237	Admin General Purpose	3,000		115	32,302	225	75.0
S 238	Sig Photo Lab	14,548		555	112,807	941	64.6
	Process	,			•		
			<u> </u>				السيبين سيا

TABLE B-1 SUMMARY BASELINE ENERGY USE

Fac	Facility	Area	Total Base	line Energ	y Use	Energy pe	r Floor SF
No.	Name	(SF)	Fuel Oil	Propane	Electric	Total	HVAC
			MBTU/Yr	MBTU/Yr	KWH/Yr	MBTU/Yr	kBTU/SFYr
P 240	Admin General Purpose	3,000		38	32,302	148	49.5
S 241	GM Facility	10,000		153	217,159	742	74.2
S 243	Admin General Purpose	3,000		33	32,302	143	47.8
S 244	Admin General Purpose	3,000		33	32,302	143	47.8
S 246	Admin General Purpose	3,000		33	32,302	143	47.8
S 247	Admin General Purpose	3,000		38	32,302	148	49.5
P 252	Vehicle Maint Shop DS	12,299	919		64,833	1,140	92.7
P 256	Vehicle Maint Shop ORG	5,294	403		30,371	507	95.7
P 259	Vehicle Maint Shop ORG	13,667	1,010		60,636	1,217	89.0
S 283	FE Maintenance Shop	4,000		143	11,329	181	45.4
S 286	Admin General Purpose	3,000		57	31,224	163	54.5
P 287	Recreation Building	5,584		193	80,676	469	83.9
S 288	General Purpose Warehouse	3,000		57	28,590	154	51.5
S 290	Electron Equip Facility	14,856		1,127	196,373	1,797	121.0
S 291	Cont Humid Warehouse	7,400		490	114,816	882	119.2
P 295	Enl Barracks w/o Dining	46,593		3,019	867,426	5,980	128.3
P 301	ADP Building	10,800		352	647,981	2,213	204.9
	_						
P 642	Detached Latrine/Shower	995		117	1,002	120	120.7
S 2201	Control Tower - Range SPT	891			1,155	4	4.4
- ··	Bldg Totals	625,458	21,759	18,337	8,078,661	67,668	108.2
	Water Well				136,240	465	
	Exterior Lighting				197,190	673	
	Non-Scope SF	152,002			1,481,731	5,057	33.3
	Grand Total	777,460	21,759	18,337	9,893,823	73,863	95.0

TABLE B-2 SUMMARY BASELINE HVAC & DHW ENERGY USE

Fac	Facility	Baseline I	IVAC Energ	gy Use	Baseline D	HW Energ	y Use
No.	Name	Fuel Oil	Propane	Electric	Fuel Oil	Propane	Electric
,,,,,		MBTU/Yr		KWH/Yr	MBTU/Yr	MBTU/Yr	KWH/Yr
T6	Family Housing NCO & Enl		58.7	6,657		43.3	
P 41A	Family Housing NCO & Enl		17	11,456	•	32.6	
P 41B	Family Housing NCO & Enl				-	32.6	
P 42A	Family Housing NCO & Enl		20	13,312	-	32.6	•
P 42B	Family Housing NCO & Enl				-	32.6	
P 43A	Family Housing NCO & Enl		20	13,312	-	32.6	
P 43B	Family Housing NCO & Enl				-	32.6	
P 44A	Family Housing NCO & Enl		20	13,312		32.6	
P 44B	Family Housing NCO & Enl	1] -	32.6	
P 45A	Family Housing NCO & Enl		20	13,312	-	32.6	
P 45B	Family Housing NCO & Enl				-	32.6	
P 46	Family Housing CG & WO		14	8,248	-	34.6	
P 47	Family Housing CG & WO	1	14	8,248	-	34.6	
P 51A	Family Housing NCO & Enl		19.9	13,312	-	32.6	
P 51B	Family Housing NCO & Enl					32.6	
P 52A	Family Housing NCO & Enl		20	13,312	-	32.6	
P 52B	Family Housing NCO & Enl				-	32.6	
P 53	Family Housing CG & WO		14	8,248	-	32.6	
P 54	Family Housing CG & WO		14	8,248	-	32.6	
P 55	Family Housing CG & WO		14	8,248		32.6	
P 56	Family Housing CG & WO		14	8,248	-	32.6	
P 57	Family Housing CG & WO		14	8,248		32.6	
P 58	Family Housing CG & WO		14	8,248	-	32.6	
P 59	Family Housing CG & WO		14	8,248	-	32.6	
P 60	Family Housing CG & WO		14	8,248	-	32.6	
S 79	Post Office, Main		-	1,565	-	-	
P 80	Exchange, Main Retail		148	14,479	-	-	20,692
P 81	Theater with Dressing Rm's		150	9,488	-	-	43,067
P 101	Open Din Cons (Hacienda)		728	18,652	•	111.8	
	Club (Bar)		359	12,941		29.9	
	Hacienda, East Rooms			134,563		101.5	
	Hacienda, West Rooms				-	110.9	
P 116	Exchange Service Station	<u> </u>	35		-	-	826
	(Non-shop areas)			1,550			
T 120	Fire Station - Office		444	11,757	-	28.3	
	Fire Station - Dorm		324	3,459	- 1	151.5	
	Fire Station - Garage	1					
T 121	Bowling Center		53	25,990	-	45.1	
I	l				-	<u> </u>	8,599
T 124	Family Housing LC & MJ		245	14,917	•	54.2	
T 127	Officers Quarters Military		193	2,783	-	126.9	
P 128	Officers Quarters Military		1,333	109,508		680.1	
T 131	Family Housing CG & WO		50	6,015	-	46.8	
S 144	Gymnasium	<u> </u>	53	418	-	0.0	

TABLE B-2 SUMMARY BASELINE HVAC & DHW ENERGY USE

Fac	Facility	Baseline H	VAC Energ	y Use	Baseline D	HW Energ	y Use
No.	Name	Fuel Oil	Propane	Electric	Fuel Oil	Propane	Electric
, , , , ,		MBTU/Yr	MBTU/Yr	KWH/Yr	MBTU/Yr	MBTU/Yr	KWH/Yr
S 146	FE Facility		256	2,464	-	-	
T 149	Family Housing NCO & Enl		146	7,668		46.8	
T 156	FE Facility - Shop		-	823	-	-	979
	FE Facility - Office						•
T 158	Vehicle Storage		-	0	-	•	
T 161	Admin General Purpose		83	5,878	•	•	
T 162	Elec Maint, Shop		83	5,878	-	•	
T 163	Officers Quarters Military		83	5,878	-	-	
T 164	Admin General Purpose		83	5,878	-	•	
T 165	Admin General Purpose		83	5,878	-	-	
T 166	Officers Quarters Military		83	5,878	-	•	
T 167	Officers Quarters Military		83	5,878	•	•	
S 168	General Purp Warehouse	No Heat	No Heat	No Heat	-	•	
T 172	Cold Storage Warehouse	No Heat	No Heat	No Heat	•	-	
P 177	Technical Library		23	14,395	-	-	
P 178	Child Development Cntr		86	17,993	-	56.7	
S 182	Commissary		51	5,643	-	-	3,585
S 186	Sup Svc Admin Bldg		120	8,677	-	-	
P 190	Post Chapel	310	-	36,505	-	-	2,726
S 197	Admin Bldg R&D - Office		268	16,361	-	-	931
	Admin Bldg R&D - Electronics		-	62,202			
S 198	General Inst Bidg		49	356	-	•	
P 205	Admin General Purpose	1,867	0	272,346	84.6	•	
P 205A	Company HQ Building				-	. •	647
P 206	Enlisted Pers Dining Fac	3,945	-	108,696	905.8	•	
	Kitchen Area - Scullery				-	-	
P 207	Enl Barracks w/o Dining	1,867	-	268,570	553.3	-	
P 207A	Company HQ Building				-	-	776
P 208	Enl Barracks w/o Dining	1,867	-	269,875	575.9	-	
P 208A	Company HQ Building				-	-	909
P 209	AAFES Snack Bar		92	68,438	-	-	67,115
P 210	Hith/Dntl Clinic w/ Beds	1,025	-	154,590	2,023.9	-	
P 211	Outdoor Swimming Pool		1,211	36,436	-	0.0	
P 212	Gymnasium		1,071	49,087	-	22.9	
P 219	Physical Fitness Center		430	17,812	•	70.1	
P 229	Enl Barracks w/o Dining	1,867	0	286,869	212.1	•	
P 229A	Company HQ Building				-	-	688
P 230	Enl Barracks w/o Dining	1,867	0	276,484	457.0	-	
P 230A	Company HQ Building					•	794
S 235	Admin General Purpose		46	18,805	-	-	
S 236	Admin General Purpose		47	18,805	-	•	
S 237	Admin General Purpose		115	18,805		-	
S 238	Sig Photo Lab		508	31,024	-	47.5	
	Process					35.6	

TABLE B-2 SUMMARY BASELINE HVAC & DHW ENERGY USE

Fac	Facility	Baseline I	IVAC Ener	gy Use	Baseline D	HW Energ	ıy Use
No.	Name	Fuel Oil	Propane	Electric	Fuel Oil	Propane	Electric
		MBTU/Yr	MBTU/Yr	KWH/Yr	MBTU/Yr	MBTU/Yr	KWH/Yr
P 240	Admin General Purpose		38	18,805	-	•	
S 241	GM Facility		153	162,971	- 1	-	3,009
S 243	Admin General Purpose		33	18,805	-	-	
S 244	Admin General Purpose		33	18,805	-	-	
S 246	Admin General Purpose		33	18,805	-	-	
S 247	Admin General Purpose		38	18,805	•	-	
P 252	Vehicle Maint Shop DS	919	-	27,085	-	-	3,715
P 256	Vehicle Maint Shop ORG	403	•	10,742		-	4,980
P 259	Vehicle Maint Shop ORG	1,010	•	19,377	-	-	3,440
S 283	FE Maintenance Shop		143	509	-	-	
S 286	Admin General Purpose		57	18,805	-		
P 287	Recreation Building		132	53,904	-	61.5	
S 288	General Purpose Warehouse		57	18,805	-	-	
S 290	Electron Equip Facility		1,064	150,755	-	62.4	
S 291	Cont Humid Warehouse		490	96,071	-	-	
P 295	Enl Barracks w/o Dining	0	2,199	703,890	·	819.8	
P 301	ADP Building		352	95,034	-		1,898
P 642	Detached Latrine/Shower			19	-	116.7	
S 2201	Control Tower - Range SPT			349	-		
	Bldg Totals	16,946	14,375	4,111,758	4,813	3,657	169,376
	Water Well						
	Exterior Lighting						
	Non-Scope SF	Nil	Nil	999,260	Nil	Nil	Nil
	Grand Total	16,946	14,375	5,111,018	4,813	3,657	169,376

TABLE B-3 SUMMARY BASELINE LIGHTING & PROCESS ENERGY USE

Fac	Facility	Area	Lighting	Baseline P	rocess Ene	rgy Use
No.	Name	(SF)	Energy	Process	Cooking	Cooking/Other
		` ′	kWH/Yr	kW-Hr/Yr	kW-Hr/Yr	Prop MBTU/Yr
T 6	Family Housing NCO & Enl	1,090	2,381	5,900	Included	10.5
P 41A	Family Housing NCO & Enl	1,397	4,230	5,900	Included	10.5
P 41B	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 42A	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 42B	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 43A	Family Housing NCO & Enf	1,937	4,230	5,900	included	10.5
P 43B	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 44A	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 44B	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 45A	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 45B	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 46	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 47	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 51A	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 51B	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 52A	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 52B	Family Housing NCO & Enl	1,937	4,230	5,900	Included	10.5
P 53	Family Housing CG & WO	2,089	4,562	5,900	included	10.5
P 54	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 55	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 56	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 57	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 58	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 59	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
P 60	Family Housing CG & WO	2,089	4,562	5,900	Included	10.5
S 79	Post Office, Main	1,000	764	1,700		
P 80	Exchange, Main Retail	9,093	10,134	112,084		
P 81	Theater with Dressing Rm's	6,719	2,301	1,058	00.400	
P 101	Open Din Cons (Hacienda)	6,171	8,423	0	39,420	
	Club (Bar)	3,046		6,092	5,475	
	Hacienda, East Rooms	4,721		4,000	look dod	10.5
	Hacienda, West Rooms	8,273	0.470	5,900	Included	10.5
P 116	Exchange Service Station	1,126	3,170	481 1.106		
	(Non-shop areas)	662	148,678	1,126		
T 120	Fire Station - Office	3,636	146,076	3,291	6,899	
	Fire Station - Dorm	2,653		2,800	0,099	
7.404	Fire Station - Garage	4,949	00,600	134	5,475	
T 121	Bowling Center	4,952	23,600	4,482 13,144	5,475	
T 104	Camily University I C 2 Mil	628	4,370	5,900	Included	10.5
T 124	Family Housing LC & MJ	2,001	8,946	4,000	ii iciaaea	10.5
T 127	Officers Quarters Military Officers Quarters Military	2,250	141,146	32,000	52,560	
P 128		20,196 998	2,180	5,900	Included	10.5
T 131	Family Housing CG & WO		2,100	6,491	11 ICIUUEU	10.5
S 144	Gymnasium	7,172	L	0,431		

TABLE B-3 SUMMARY BASELINE LIGHTING & PROCESS ENERGY USE

Fac	Facility	Area	Lighting		Baseline Pr	ocess Ene	rgy Use
No.	Name	(SF)	Energy		Process	Cooking	Cooking/Other
		` '	kWH/Yr		kW-Hr/Yr	kW-Hr/Yr	Prop MBTU/Yr
S 146	FE Facility	4,042	5,179	Ì	1,727		
T 149	Family Housing NCO & Enl	1,196	1,124		5,900	Included	10.5
T 156	FE Facility - Shop	1,753	9,186		749		
	FE Facility - Office	497			450		•
T 158	Vehicle Storage	1,859			50		
T 161	Admin General Purpose	2,250	8,643		2,036		
T 162	Elec Maint. Shop	2,250	5,063	L	961		
T 163	Officers Quarters Military	2,250	3,375		NA		
T 164	Admin General Purpose	2,250	5,063		2,036		
T 165	Admin General Purpose	2,250	5,063		2,036		
T 166	Officers Quarters Military	2,250	3,375		NA		
T 167	Officers Quarters Military	2,250	3,375		NA		
S 168	General Purp Warehouse	6,560			178		
T 172	Cold Storage Warehouse	800			22	Also see E	3ldg 182
P 177	Technical Library	3,599	16,048		3,257		
P 178	Child Development Cntr	3,599	19,089		272	10,184	
\$ 182	Commissary	3,000	25,040		172,782		
S 186	Sup Svc Admin Bldg	1,920	11,221	11	1,738		
P 190	Post Chapel	2,720	3,253	1	1,058	1,643	
S 197	Admin Bldg R&D - Office	2,100	35,560		1,901		
	Admin Bldg R&D - Electronics	6,062			2,589		
S 198	General Inst Bidg	1,090	3,961	L	986		
P 205	Admin General Purpose	35,820	90,837	I	32,417		
P 205A	Company HQ Building	5,161	30,192		4,671		
P 206	Enlisted Pers Dining Fac	16,768	43,023			184,946	:
	Kitchen Area - Scullery			L			
P 207	Enl Barracks w/o Dining	35,820	84,082		32,000		
P 207A	Company HQ Building	5,161	30,192	-	4,671		
P 208	Enl Barracks w/o Dining	35,820	84,781		36,000		
P 208A	Company HQ Building	5,161	30,192	L	4,671		
P 209	AAFES Snack Bar	3,320	7,568		6,640	98,550	
P 210	Hith/Dntl Clinic w/ Beds	10,973	126,081	L	37,308	2,957	
P 211	Outdoor Swimming Pool	-	20 - 22				
	Gymnasium	8,907	33,566	ŀ	8,061		
P 219	Physical Fitness Center	3,212	25,722		2,907		
P 229	Enl Barracks w/o Dining	40,915	84,781		11,200		
	Company HQ Building	5,161	30,192		4,671		
P 230	Enl Barracks w/o Dining	35,820	84,781		32,000		
	Company HQ Building	5,161	30,192		4,671		
S 235	Admin General Purpose	3,000	10,783		2,715		
S 236	Admin General Purpose	3,000	10,783		2,715		
S 237	Admin General Purpose	3,000	10,783	L	2,715		
S 238	Sig Photo Lab	14,548	52,191		13,166	•	
	Process			L	16,425		

TABLE B-3 SUMMARY BASELINE LIGHTING & PROCESS ENERGY USE

Fac	Facility	Area	Lighting	Baseline Process Energy Use
No.	Name	(SF)	Energy	Process Cooking Cooking/Other
l			kWH/Yr	kW-Hr/Yr kW-Hr/Yr Prop MBTU/Yr
P 240	Admin General Purpose	3,000	10,783	2,715
S 241	GM Facility	10,000	42,129	9,050
L				·
S 243	Admin General Purpose	3,000	10,783	2,715
S 244	Admin General Purpose	3,000	10,783	2,715
S 246	Admin General Purpose	3,000	10,783	2,715
S 247	Admin General Purpose	3,000	10,783	2,715
P 252	Vehicle Maint Shop DS	12,299	28,780	5,254
P 256	Vehicle Maint Shop ORG	5,294	12,388	2,261
P 259	Vehicle Maint Shop ORG	13,667	31,981	5,838
S 283	FE Maintenance Shop	4,000	9,112	1,709
S 286	Admin General Purpose	3,000	9,704	2,715
P 287	Recreation Building	5,584	15,604	11,168
S 288	General Purpose Warehouse	3,000	9,704	81
S 290	Electron Equip Facility	14,856	39,273	6,346
S 291	Cont Humid Warehouse	7,400	15,584	3,161
P 295	Enl Barracks w/o Dining	46,593	117,936	45,600
P 301	ADP Building	10,800	46,003	9,774
				495,272
P 642	Detached Latrine/Shower	995	983	
S 2201	Control Tower - Range SPT	891		806
	Bldg Totals	625,458	1,958,377	1,431,044 408,107 304.5
	Water Well			136,240
	Exterior Lighting		197,190	
	Non-Scope SF	152,002	475,935	6,536 Shop/Wh
	Grand Total	777,460	2,631,502	1,573,820 408,107 304.5

Table B-4 Baseline HVAC Energy Use Calculations Results

Fac	HVAC	Primary Hee	Primary Heating Energy Use		Primary Coolin		se	Ì	Auxiliary Energy Use	rgy Use		Total HVAC Energy Use	nergy Use		HVAC Energy	per Floor SF
Š	Estimate	Electric	Propane	Fuel Oil	Compressor	CT/Cond	Cond Pmp	Other Acc	SA Fans	Circ Pmp	Base Util	Electric	Propane	Fuel Oil	Total	HVAC
	Basis	kWH/Yr	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	Mil BTU/Yr	Mil BTU/Yr	MBTU/Yr	k BTU/SF-Yr
16	BIN		58.7		5,500	All compone	components included		1,157	0	0	6,657	58.7		81.4	74.7
P 41A	ID to P51A	1,190	11	0	065'2	908	0	727	1,114	0	0	11,456	41	0	56.2	16.9
P 41B	Incl @ P51A															
7 42A	ID to P51A	1,383	8	0	8,820	0.68	0	845	- 28	0	0	13,312	ଷ	0	65.3	16.9
P 43A	ID to P51A	1,383	8	0	8,820	026	0	845	282	°	°	13.312	8	C	65.3	16.9
P 43B	Incl @ P51A												1)		
P 44A	ID to P51A	1,383	8	0	8,820	026	0	845	1,294	0	0	13,312	ଷ	0	65.3	16.9
7 44 10	Incl @ P51A															
P 45A	ID to P51A Incl @ P51A	1,383	8	0	8,820	026	0	845	1,284 1	0	0	13,312	8	0	65.3	16.9
P 46	Trace 600	930	14.0	0	5,757	998	0	410	485	0	0	8,248	41	0	42.2	20.2
P 47	ID to P46	830	14	0	5,757	999	0	410	485	0	0	8,248	4		42.2	
P 51A P 51B	Trace 600 Incl @ P51A	1,383	19.9	0	8,820	026	0	845	1,294	0	0	13,312	19.9	0	65.3	16.9
P 52A P 52B	ID to P51A incl @ P51A	1,383	20	0	8,820	026	0	845	1,294	0	0	13,312	8	o	65.3	16.9
P 53	ID to P46	830	14	0	5,757	998	٥	410	485	٥	٥	8,248	4	0	42.2	20.2
P 54	ID to P46	930	14	0	5,757	999	0	410	485	0	0	8,248	14	0	42.2	
P 55	ID to P46	930	14	0	5,757	999	0	017	485	0	0	8,248	4-	0	42.2	20.2
P 56	ID to P46	930	14	0	5,757	999	0	410	485	0	0	8,248	14	0	42.2	20.2
P 57	ID to P46	930	41	0	5,757	999	0	410	485	0	0	8,248	14	0	42.2	20.2
88 88	ID to P46	930	4.	0	5,757	989	0	410	485	0	0	8,248	14	0	42.2	20.2
P 59	ID to P46	930	4	0	5,757	999	0	410	485	0	0	8,248	14	0	42.2	20.2
8	ID to P46	930	14	0	5,757	999	٥	410	485	0	0	8,248	14	0	42.2	20.2
S 73	Manual	1,080	<u>'</u>]		485	•	•	-	•	-	-	1,565	•	-	5.3	5.3
98 80	Trace 600	1,638	148		11,449	1,001	٥	377	Included	14	0	14,479	148	-	197.7	21.7
P 81	Sim to P80		150	'	8,460	740	0	279	0	10	0	9,488	150	-	182.4	27.1
P 10	<u>x</u>	8	728	•	14,000	hepnlou	Included	054	3,058	764	0	18,652	728		1,654.6	118.7
	N N	118	320	•	000's	Included	Included	1	3,058	764	ō	12,941	320	•		
:	Manuai	131,383	•	,	1,492	Included	Included	1,679	hepriou	0	0	134,563		<u> </u>		
P 116	Bin		35.0	,	0	0	٥	0	666	0	0		36		40.3	22.5
	Sim to P80	616	<u>'</u>	٥	834	£	0	27	Included	0	0	1,550	•	0		
± 20	BN	•	4	'	6,234	Included	pepnjoul	2,190	3,333		0	11,757	444	 -	820.5	73.0
	N B	•	324	1	0	pepnou	Included	3,459	Included	•	0	3,459	324	,		
	Manual	<u>'</u>	°		٥	٥	٥	0	0	0	٥					
T 121	Trace 600	5,787	53.0	•	11,475	1,511	0	050	6,568	0	0	25,990	SS.	,	141.7	28.6
T 124	Sim to T6	0	245		10,097	Ш	0	0	4,820	0	0	14,917	245		295.4	147.6
T 127	BIN	501	193		1,153	Evar	0	0	1,129	0	0	2,783	193	• -	202.6	
P 128	Trace 600	3,582	1,333			6,72	0	1,276	24,480	13,12	0	109,508	1,333		1,706.7	
T 131	Sim to T6	• =	49.7	-	960'\$	<u> </u>	0	0	878	0	0	6,015	05	0		

Table B-4 Baseline HVAC Energy Use Calculations Results

9	264		Lillian & Loaning Prior 87 236													
ó	Estimate	Electric	Propane	Fuel Oil	Compressor	CT/Cond	dmd bu	Other Acc	SA Fans	Circ Pmp	Base Util	Electric	Propane	Fuel Oil	Total HVAC	HVAC
	Basis	KWH/Yr	Mil BTU/Yr	MII BTU/Yr	KWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	Mil BTU/Yr	Mil BTU/Yr	MBTU/Yr	k BTU/SF-Yr
S 144	Manual	•	52.5	•	0	0	0	103	315	0	0	418	53		6.63	7.5
S 146	Manual		256	•	0	0	0	617	1,847	0	0	2,464	528		264.3	65.4
T 149	Sim to T6	0	146	0	900'9	0	0	0	1,633	0	0	7,668	146	0	172.3	144.1
T 156	Manual	•	, ,	, ,	823	0	0	0	0	0	0	628	•	,	2.8	1.6
158	Menual				0	0	r	6	0	°	0	c				
T	NIN.		83.3	•	4,470	Included	0	0	1,408	0	0	5,878	8		103.3	45.9
Т	Sim to T161	0	83.3	0	4,470	0	0	0	1,408	0	0	5,878	83	0	103.3	45.9
T	Sim to T161	0	83.3		4,470	0	0	0	1,408	0	0	5,878	88	0	103.3	45.9
Т	Sim to T161	0	83.3		4.470	٥	٥	0	1.408	0	0	5.878	88	0	103.3	45.9
T	Sim to T161	0	83.3		4,470	٥	0	0	1.408	0	0	5,878	88	0	103.3	45.9
Т	Sim to T161	0	83.3		4,470	0	0	0	1,408	٥	0	5,878	88	٥	103.3	45.9
Т	Sim to T161	0	83.3		4,470	٥	0	0	1,408	0	0	5,878	88	0	103.3	45.9
Τ	Manual	No Heat	No Heat	No Heat	٥	0	0	0	0	٥	0	0	No Heat	No Heat	,	
Ť	Manual	No Heat	L	No Heat	0	٥	0	0	0	0	0	0	No Heat	No Heat	•	
P 177	Trace 600		22.8	•	12,779	1,193	0	88	324	0	0	14,395	83	-	71.9	20.0
P 178	Sim to P177	0	98	0	15,974	1,491	0	124	404	0	0	17,993	98	0	147.8	41.0
S 182	Trace 600	0	51	0	5,067	200	0	92	pepnipui	0	0	5,643	51	0	7.07	23.6
	BIN	•	119.5	•	7,546	Щ	pepnioui	Included	1,131	0	0	8,677	120		149.1	1.11
	Trace/Manual	163	٠	310	34,548		0	320	573	901	0	36,505	•	310	434.6	159.8
S 197	NIS	47,302	288.1	•	12,691 6,440	Included	heluded Included	Included Included	3,670	00	00	16,361 62,202	268	-	536.2	65.7
S 198	N. S.		67	•	144	Evap Cooler		0	212	0	0	356	48	-	50.3	46.1
 	ID to 207	88	0	1,867	75,217		0	7,118	188,662	831	0	272,346	0	1,867	2,796.5	68.2
		0	,	3,945	49,146	Included	0	20,613	38,691	246	o	108,696		3,945	4,315,7	257.4
P 207	Trace/Manual	88	'	1,867	75,217	Included	0	7,118	184,906	931	0	268,570		1,867	2,783.6	67.9
P 208	ID to 207	368	'	1,867	79,355	pepnipul	0	7,118	182,073	183	0	269,875		1,867	2,788.1	0.88
٦Ī	Incl @ P207															
	BIN/Manual		85				0	1,327	20,578		0	68,438	92	-	325.2	98.0
P 210	Trace 600	7,201	`	1,025	25,095	3,309	0	1,004	112,946		0	154,590	-	1,025	1,552.2	141.5
	Manual	1,392	1,211	•	0	0	0	0	0	35,044	0	36,436	1,211	•	1,335.1	٧N
P 212	Sim to B219		1,071	-	12,612	0	0	26,022	8,041	2,413	0	49,087	1,071	,	1,238.6	139.1
P 219	Trace/Manual	110	430	•	4,548	Evap Cirs	0	9,384	2,900		0	17,812	064		490.8	152.8
P 229 P 229A	Trace/Manual Incl @ P229	368	0	1,867	79,355	Ĕ	0	7,118	199,067	931	0	286,869	0	1,867	2,846.1	61.8
P 230 P 230A	ID to P229 Incl @ P229	86	0	1,867	79,355	Included	0	7,118	186,682	88	0	276,484	o	1,867	2,810.6	9.89
1 .	ID to P240	96'8	46.4	0			0	502	0	0	0	18,805		•	110.6	36.8
S 236	ID to P240	8,936				728	0	205	0	0	0	18,805	47	0	111.0	37.0
	0770	9000	0,,,,													

Table B-4 Baseline HVAC Energy Use Calculations Results

Fac	HVAC	Primary Hea	Primary Heating Energy Use		Primary Cooling	ng Energy Use	Se		Auxiliary Energy Use	esh ve		Total HVAC Energy Use	nergy Use		HVAC Energy per Floor SF	per Floor SF
Š	Estimate	Electric	Propane	Fuel Oil	Compressor	T/Cond	dm4 bu	Other Acc	SA Fans	Circ Pmp	Base Util	Electric	Propane	Fuel Oil	Total	HVAC
	Basis	kWH/Yr	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr	kWH/Yr	kWH/Yr	KWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	kWH/Yr	Mil BTU/Yr	Mil BTU/Yr	MBTU/Yr	k BTU/SF-Yr
S 238	Trace 600	1,336	909	0	20,210	2,396	0	3,423	3,650	O3	0	31,024	909	0	613.8	42.2
P 240	Trace 600	8,936	38	0	966'8	728	0	202	fucluded	0	0	18,805	38	0	102.4	34.1
S 241	Trace 600	12,231	153	0	16,585	2,186	0	2,451	125,528	4,009	0	162,971	153	0	709.3	70.9
S 243	ID to P240	8,936	EE	0	966'8	128	0	205	0	0	0	18,805	33	0	97.2	32.4
S 244	ID to P240	8,936	EE	0	966'8	728	0	205	0	0	0	18,805	33	0	97.2	32.4
S 246	ID to P240	966'8	£	0	96'8	728	0	205	0	0	0	18,805	33	0	97.2	32.4
S 247	ID to P240	8,936	38	0	966'8	728	0	205	0	0	0	18,805	38	0	102.4	34.1
P 252	NiB	14,280	•	919	4,480	pepnjouj	Included	2,253	3,621	2,451	0	27,085		616	1,011	82.2
P 256	BIN	4,577		403	002	pepnipuj	pepnioul	2,150	1,681	1,634	0	10,742		403	440	83.0
P 259	ID to P 252	9,102		1,010	0	pepniou	pepnipul	3,686	4,138	2,451	0	19,377		1,010	1,076	78.7
S 283	Manual	•	143	•	0	•	•	154	355			809	143		145	36.1
S 286	ID to P240	966'8	29	0	966'8	728	0	205	0	0	0	18,805	57	0	121	40.3
P 287	BiN/Manual	205	132	-	18,628	2,832	0	436	31,504			53,904	132	•	316	56.5
S 288	ID to P240	8,936	29	0	966'8	728	0	502	0	0	0	18,805	22	0	121	40.3
S 280	Trace 600	4,808	1,064	•	12,581	1,554	0	723	128,286	2,825	0	150,755	1,064		1,579	106.3
S 291	Trace 600	3,276	490	0	7,727	738	0	673	63,633	24	0	120'96	490	٥	818	110.6
P 295	Trace 600	11,696	2,199	0	167,874	16,905	0	1,891	490,498	15,026	0	703,890	2,199	0	4,602	98.8
P 301	Trace 600	154	362	•	25,048	2,997	0	5,994	60,841	0	0	95,034	352	•	878	62.6
				•												
P 642	Manual	19	1	-	0	0	0	0	0	0	0	19		,	90.0	0.1
	BIN	283	•	•	99	느	0	0	pepnjoul	0	0	349		-	1.19	
Totals		373,367	14,375	16,946	1,283,865	68,842	0	141,738	2,152,015	92,930	0	4,111,758	14,375	16,946	45,355	72.5

TABLE B-5 EXISTING HEATING EQUIPMENT EFFICIENCIES SERVING EEAP BUILDINGS

Fac	Heating System						
No.	Firing Eff	Auxilliary	Radient	Convection	Shut-Down	General	Net Eff
	%	%	%	%	%	%	%
T 6	80.0%	•	8.0%	3.0%	2.0%	1.0%	66.0%
P 41A	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 41B	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 42A	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 42B	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 43A	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 43B	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 44A	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 44B	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 45A	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 45B	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 46	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 47	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 51A	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 51B	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 52A	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 52B	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 53	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 54	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 55	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 56	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
P 57	80.0%		4.0%	2.0%	1.0%	1.0%	72.0%
P 58	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 59	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
P 60	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
S 79	•	•	•	•	-	-	-
P 80	84.5%	-	8.0%	4.0%	2.0%	2.0%	68.5%
P 81	85.0%	-	4.0%	3.0%	2.0%	2.0%	74.0%
P 101	82.9%	-	6.0%	4.0%	2.0%	3.0%	67.9%
	Same	Same	Same	Same	Same	Same	Same
	-	•	-	-	-	-	•
	Included	Included	Included	Included	included	Included	included
P 116	85.0%	-	4.0%	3.0%	2.0%	2.0%	74.0%
	7.15 Btu/W-Hr	-		-	•	-	
T 120	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
	80.0%	-	6.0%	4.0%	2.0%	2.0%	66.0%
	75.0%	-	10.0%	4.0%	2.0%	3.0%	56.0%
T 121	75.0%	•	4.0%	3.0%	2.0%	2.0%	64.0%
. — .							
T 124	80.0%	•	8.0%	3.0%	2.0%	2.0%	65.0%
T 127	80.0%	-	8.0%	4.0%	2.0%	2.0%	64.0%
P 128	89.0%	-	8.0%	4.0%	2.0%	2.0%	73.0%
T 131	80.0%	-	10.0%	4.0%	2.0%	3.0%	61.0%
S 144	80.0%	-	6.0%	3.0%	2.0%	2.0%	67.0%
S 146	80.0%	•	8.0%	5.0%	2.0%	3.0%	62.0%
T 149	80.0%	-	8.0%	3.0%	2.0%	2.0%	65.0%
T 156		_	-	-	-	•	-
00	_		-	_	_	-	_
T 158	-				•		-
T 161	80.0%		4.0%	2.0%	1.0%	1.0%	72.0%
T 162	80.0%		4.0%	2.0%	1.0%	1.0%	72.0%
	J 30.076		7.070	2.070	1.070	1.0/0	. 2.5/0

TABLE B-5 EXISTING HEATING EQUIPMENT EFFICIENCIES SERVING EEAP BUILDINGS

Fac	Heating System			Tä :	1		
No.	Firing Eff	Auxilliary	Radient	Convection	Shut-Down	General	Net Ef
	%	%	%	%	%	%	<u>%</u>
T 164	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
T 165	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
T 166	80.0%	•	4.0%	2.0%	1.0%	1.0%	72.0%
Г 167	80.0%	-	4.0%	2.0%	1.0%	1.0%	72.0%
S 168	•	-	•	-	-	-	•
T 172	•	•	•	-	-	-	
P 177	78.4%	•	5.0%	3.0%	2.0%	2.0%	66.4%
P 178	80.0%	3.0%	5.0%	3.0%	2.0%	2.0%	65.0%
S 182	77.0%	2.0%	5.0%	3.0%	2.0%	2.0%	63.0%
S 186	78.0%	-	5.0%	3.0%	2.0%	2.0%	66.0%
P 190	85.7%	-	5.0%	3.0%	2.0%	2.0%	73.7%
S 197	86.0%	-	8.0%	5.0%	2.0%	2.0%	69.0%
		-	-	-		-	•
S 198	80.0%	•	5.0%	3.0%	2.0%	2.0%	68.0%
205	87.7%	•	7.0%	4.0%	2.0%	3.0%	71.7%
P 205A	87.7%		7.0%	4.0%	2.0%	3.0%	71.7%
P 206	86.8%	-	7.0%	4.0%	2.0%	3.0%	70.8%
	30.07						
P 207	87.4%	•	7.0%	4.0%	2.0%	3.0%	71.4%
P 207A	87.4%		7.0%	4.0%	2.0%	3.0%	71.4%
P 208	88.1%		7.0%	4.0%	2.0%	3.0%	72.1%
P 208A	88.1%	_	7.0%	4.0%	2.0%	3.0%	72.1%
P 209	77.2%	-	6.0%	5.0%	2.0%	3.0%	61.2%
P 210	81.1%	-	4.0%	3.0%	2.0%	2.0%	70.1%
P 211	77.2%	-	5.0%	3.0%	2.0%	2.0%	65.2%
P 212	81.7%		6.0%	4.0%	2.0%	3.0%	66.7%
P 219	79.0%	•	6.0%	3.0%	1.0%	2.0%	67.0%
P 229	87.9%		7.0%	4.0%	2.0%	3.0%	71.9%
P 229A	87.9%		7.0%	4.0%	2.0%	3.0%	71.9%
P 230	87.2%		7.0%	4.0%	2.0%	3.0%	71.2%
P 230A	87.2%	_	7.0%	4.0%	2.0%	3.0%	71.2%
S 235	77.0%		4.0%	3.0%	1.0%	2.0%	67.0%
S 236	77.0%		4.0%	3.0%	1.0%	2.0%	67.0%
S 237	77.0%		4.0%	3.0%	1.0%	2.0%	67.0%
S 238	81.9%		5.0%	4.0%	2.0%	2.0%	68.9%
U 200	U1.379		3.57	,			
P 240	77.0%		4.0%	3.0%	1.0%	2.0%	67.0%
S 241	83.6%		8.0%	4.0%	2.0%	3.0%	66.6%
C 2-71		_		-	-		0.0%
	_	-				[
S 243	77.0%	-	4.0%	3.0%	1.0%	2.0%	67.0%
S 243	77.0%	-	4.0%	3.0%	1.0%	2.0%	67.0%
S 244	77.0%	-	4.0%	3.0%	1.0%	2.0%	67.0%
	77.0%	-	4.0%	3.0%	1.0%	2.0%	67.0%
S 247			4.0%	3.0%	2.0%	2.0%	73.0%
P 252	84.0%	•		3.0%	2.0%	2.0%	71.7%
P 256	82.7%	-	4.0%	3.0%	2.0%	2.0%	73.9%
P 259	84.9%	<u> </u>	4.0%		2.0%	3.0%	69.0%
S 283	80.0%	•	4.0%	2.0%	2.076	3.076	J-3.0%
0.655	-		4.00/	2.09/	1 00/	2.09/	67.09
S 286	77.0%	<u> </u>	4.0%	3.0%	1.0%	2.0%	67.09
P 287	75.0%		4.0%	3.0%	2.0%	2.0%	64.09 67.09

TABLE B-5 EXISTING HEATING EQUIPMENT EFFICIENCIES SERVING EEAP BUILDINGS

Fac	Heating System	Losses					
No.	Firing Eff	Auxilliary	Radient	Convection	Shut-Down	General	Net Eff
	%	%	%	%	%	%	%
S 290	80.8%	-	8.0%	4.0%	2.0%	3.0%	63.8%
	-	-	•	-		-	-
S 291	78.8%	3.0%	7.0%	4.0%	2.0%	3.0%	59.8%
P 295	77.7%	-	8.0%	5.0%	2.0%	3.0%	59.7%
P 301	84.0%		6.0%	3.0%	2.0%	2.0%	71.0%
	-	-	-	-	-	-	-
P 642	-	-	.•	-	-	•	•
S 2201	-	-	-	-	-	-	<u> </u>

Table B-6 omestic Hot Water Consumption Rate Data

			Domestic Hot	Domestic Hot Water Consumption Rate Data	tion Rate Data	
Function	Description of Usage	Gallons per Capita Day	oita Day	Lo-Flow GPCD's	D's	Basis of
Code		Non-Cooking	Cooking	Non-Cooking	Cooking	GPCD Data
1	Offices	2.00	00'0	1.10	0.00	TM 5-810-5, Chapter 4.
8	2 Shops and Warehouses	2.00	00.0	3.50	00.0	0.00 TM 5-810-5, Chapter 4.
2.1	2.1 Commercial Laundries	Separate Calculations	lations	Separate Calculations	lations	
	3 Barracks & Quarters w/o Dining	30.00	00.00	14.93	00.0	0.00 TM 5-810-5, Chapter 4.
3.1	3.1 Detached Latrine with Bathing	24.00	00.0	8.93	0.00	TM 5-810-5, Chapter 4.
→	Barracks & Quarters with Dining	30.00	3.33	14.93	3.33	TM 5-810-5, Chapter 4.
2	5 Recreation & Gyms w/o Bathing	0.50	3.33	0.35	3.33	TM 5-810-5, Chapter 4, assumes 1/4 Code 1 restroom usage
5.1	5.1 Recreation & Gyms with Bathing	12.00	3.33	4.58	3.33	TM 5-810-5, Chapter 4.
9	6 Theaters / Community Facilities	0.50	3.33	0.35	3.33	TM 5-810-5, Chapter 4, assumes 1/4 Code 1 restroom usage
_	Dining Facilities, all uses	0.25	3.33	0.18	3.33	TM 5-810-5, Chapter 4, assumes 1/8 Code 1 restroom usage
80	8 Base Exchanges & Stores	0.50	3.33	0.35	3.33	TM 5-810-5, Chapter 4, assumes 1/4 Code 1 restroom usage
9.1	8.1 Commissaries	0.50	3.33	0.35	3.33	
6	9 Clubs, Officers, NCO, Eni PN	2.00	3.33	1.10	3.33	TM 5-810-5, Chapter 4, allowance for hand & bar washing
2	10 Family Housing (Total incl Cooking)	40.00	Included	17.80	Included	TM 5-810-5, Chapter 4.
11.1	11.1 Schools w/o Bathing	2.00	3.33	1.83	3.33	3.33 TM 5-810-5, Chapter 4.
11.2	11.2 Schools with Bathing	11.00	3.33	3.73	3.33	TM 5-810-5, Chapter 4, Code 11.1 plus assume 1/2 shower daily.
11.3	Child Development Centers	8.00	3,33	2.00	3.33	Added usage from Function Code 11.1 for diapering, etc.
12	12 Medical Facilities, Clinics	20.00	3.33	20.00	3.33	3.33 TM 5-810-5, Chapter 4, assumed less than in-patient care
12.1	12.1 Medical Facilities, Hospitals	120.00	3.33	120.00	3.33	3.33 Per Patient: TM 5-810-5, Chapter 4.
13	13 Multiple Usage Buildings	Separate Calculations	ulations	Separate Calculations	lations	

TABLE B-7 EXISTING DOMESTIC HOT WATER HEATING EQUIPMENT EFFICIENCIES SERVING EEAP BUILDINGS

Fac		ant Efficie	De	0	Chie Davis	Gososall	Diant I	Net
No.	Firing Eff	Auxilliar	Radiant	Convection	Snut-Down	General	Plant Losses	Eff
·			4 667	0.00/	2.0%	2.0%	11.0%	59.09
6	70.0%		4.0%					
9 41A	76.1%	- :	4.0%		1.0%	1.0%	8.0%	68.19
9 41B	76.1%		4.0%			1.0%	8.0%	68.19
42A	76.1%	•	4.0%		1.0%	1.0%	8.0%	68.19
42B	76.1%	•	4.0%		1.0%	1.0%	8.0%	68.19
43A	76.1%	-	4.0%	2.0%	1.0%		8.0%	68.19
2 43B	76.1%	•	4.0%	2.0%	1.0%	1.0%	8.0%	68.19
244A	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.19
9 44B	76.1%		4.0%	2.0%	1.0%	1.0%	8.0%	68.19
9 45A	76.1%		4.0%		1.0%	1.0%	8.0%	68.19
9 45B	76.1%		4.0%		1.0%	1.0%	8.0%	68.1
P 46	76.1%		4.0%			1.0%	8.0%	68.1
47	76.1%		4.0%				8.0%	68.19
P 51A	76.1%		4.0%				8.0%	68.19
2 51B	76.1%		4.0%				8.0%	68.1
52A	76.1%		4.0%				8.0%	68.1
P 52B	76.1%		4.0%			1.0%	8.0%	68.1
			4.0%			1.0%	8.0%	68.1
P 53	76.1%		4.0%			1.0%		68.1
P 54	76.1%					1.0%	8.0%	68.1
² 55	76.1%		4.0%					68.1
² 56	76.1%		4.0%				8.0%	68.1
² 57	76.1%		4.0%					
P 58	76.1%		4.0%			1.0%	8.0%	68.1
² 59	76.1%		4.0%				8.0%	68.1
² 60	76.1%	-	4.0%	2.0%	1.0%	1.0%	8.0%	68.1
5 79	<u> </u>	•	-	-	-	•		
P 80	•	•	•					
P 81		•	•	-		-	-	
P 101	70.0%	•	8.0%				18.0%	52.0
	70.0%		4.0%	4.0%		2.0%	12.0%	58.0
	70.1%	-	4.0%	3.0%		2.0%	11.0%	59.1
	70.8%	-	4.0%	3.0%	1.0%	1.0%	9.0%	61.8
P 116		•	-	_	•	•	-	
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0
T 120	75.2%		6.0%		2.0%	3.0%	15.0%	60.2
	70.1%		6.0%			3.0%	15.0%	55.1
	0.0%							0.0
T 121	70.0%		6.0%					56.0
	70.0%	-	0.076	7.5%			0.0%	
T 124	70.0%		4.0%	4.0%	2.0%	2.0%		58.0
	70.0%							60.1
T 127	A		4.0%					63.2
P 128	75.2%		5.0%					58.0
T 131	70.0%		4.0%				14.0%	56.1
S 144	70.1%	· · · · · · · · · · · · · · · · · · ·	6.0%	4.0%	2.0%	2.0%	17.070	JU. 1
S 146		-	-	-			10.00/	E0 ^
T 149	70.0%	-	4.0%	4.0%	2.0%	2.0%	12.0%	58.0
T 156		-	-	-	-	-		
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0
T 158			-	-	•	-	-	
T 161	-	-	-	-	•	-	-	
T 162	-	-	-	-	-		-	
T 163	 	-	-	-		-	-	

TABLE B-7 EXISTING DOMESTIC HOT WATER HEATING EQUIPMENT EFFICIENCIES SERVING EEAP BUILDINGS

No.	Firing	Auvillier	Radiant	Convection	Shut-Down	General	Plant	Net
140.	Eff	Auxillidi	rayla it	CONTECTION	J.1.0. DOWN	30.10141	Losses	Eff
T 164	-	-	-	-	•	-	-	
T 165	-	-	-	-	•		-	
T 166	-	-	-	•	•		-	
T 167	-	-	-	•	•	-	-	
S 168		-	-	-	•		- 1	
T 172			-		-		-	
P 177		-		-	-	-	-	
P 178	80.0%		4.0%	3.0%	2.0%	1.0%	10.0%	70.0
S 182	30.075			-	-	-	-	
S 186	-	_	-	-	-	-	- 1	
P 190		_		•		-	-	
S 197	_						-	
0 101	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	0.0
S 198	J.U /8	0.0%	0.070	0.076	3.5 /			
P 205	87.7%		7.0%	4.0%	2.0%	3.0%	16.0%	71.7
P 205A	07.77		7.070	7.076		3.579		
P 205A	86.8%		7.0%	4.0%	2.0%	3.0%	16.0%	70.8
r 200				0.0%	0.0%	0.0%	0.0%	0.0
0.207	Dish W	0.0%				3.0%	16.0%	71.4
P 207	87.4%	-	7.0%	4.076	2.076	3.0 /8	10.079	7 1.4
P 207A	- 00.40/	-	7.0%	4.0%	2.0%	3.0%	16.0%	72.1
P 208	88.1%	-	7.076	4.076	2.076	3.0 /a	10.0 /8	12.1
P 208A	-			-		-		
P 209	-	-	- - 00/	3.00/	2.0%	2.0%	12.0%	58.0
P 210	70.0%	-	5.0%	3.0%		3.0%	15.0%	66.0
P 211	81.0%	-	6.0%		2.0% 2.0%			56.1
P 212	70.1%	-	6.0%	4.0%		2.0% 2.0%	14.0%	64.9
P 219	75.9%	-	5.0%	3.0%	1.0%			71.9
P 229	87.9%	-	7.0%	4.0%	2.0%	3.0%	16.0%	/ 1.9
P 229A	•	•	-	-			- 40.004	
P 230	87.2%	_	7.0%	4.0%	2.0%	3.0%	16.0%	71.2
P 230A	-	-	-	-	-		-	
S 235	-	-	•	-	•		-	<u> </u>
S 236	-	-	-	-	-		-	•
S 237	-	-		-	•		44.331	00.5
S 238	80.3%	-	4.0%	3.0%	2.0%	2.0%	11.0%	69.3
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0
P 240	-	-	-	- 1				
S 241	-	-		-	•	-		
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0
\$ 243	-	•	-	-	-			
S 244	-	-	-	-	-		-	
S 246	•	-	-	-	-			•
S 247	-	-	-	-	-	-	-	
P 252	-	-	-	-	-	•	-	
P 256	-	-	-	-	-	-	-	
P 259	-	-	-	-	-	-	•	
S 283	_	-	-	-	-	- 1	-	
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0
S 286	2.0,0	- 0.070			-	- 1		
P 287	73.0%		7.0%	4.0%	2.0%	2.0%	15.0%	58.0
S 288	, 3.0 /6	-	-					

TABLE B-7 EXISTING DOMESTIC HOT WATER HEATING EQUIPMENT EFFICIENCIES SERVING EEAP BUILDINGS

Fac	DHW PI	ant Efficie	ency					
No.	Firing	Auxilliar	Radiant	Convection	Shut-Down	General	Plant	Net
	Eff						Losses	Eff
S 290	70.4%	•	8.0%	4.0%	2.0%	3.0%	17.0%	53.4%
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
S 291	-	-	•	•	-	-	-	-
P 295	77.7%	•	8.0%	5.0%	2.0%	3.0%	18.0%	59.7%
P 301	-	•	•	-	-	-	-	-
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
P 642	75.2%	-	7.0%	4.0%	2.0%	3.0%	16.0%	59.2%
S 2201	-	-	-		-	-	-	-

TABLE B-8 BASELINE DOMESTIC HOT WATER ENERGY USE CALCULATIONS

	Electric	kWH/Yr	•	•	•	•		١	٠	1		-	•	-	•		-		-	•	•	•	•	ı	•	•	•	•	20,692	43,067	•	,	,		826	•	F 1
/Energy Use	Propane	Mil BTU/Yr	43.30	32.63	32.63	32.63	32.63	32.63	32.63	32.63	32.63	32.63	32.63	34.57	34.57	32.63	32.63	32.63	32.63	32.63	32.63	32.63	32.63	32.63	32.63	32.63	32.63	•	•	•	111.85	29.87	101.48	110.91	•	28.34	151.49
Baseline DHW Energy Use	Fuel Oil	Mil BTU/Yr	_	-	•	1		•	-	•	•	-	•	•	•	•	•	•	•	•	•	-	1	•	•	ı	•	1	1	•	1	ı	•	•		•	•
		Pipe	9.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	0.0	8.9	1.3	27.1	1.0	9.3	19.2	0.3	10.8	16.8
Added Losses	Mil BTU/Yr	Tank	3.1	1.4	1.4	1.4	4.	4.1	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	0.0	5.1	5.2	5.2	3.3	5.6	2.4	0.4	3.9	6.5
	DHW Usage	Mil BTU/Yr	12.98	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	18.39	00.00	34.92	87.31	15.72	7.29	22.68	41.39	1.52	2.13	60.28
Degree F CW Temp	GPCD's	Cooking	Included	pepnjou	pepnjou	Included	Included	Included	Included	Included	Included	0.00	3.33	3.33	3.33	3.33	0.00	Included	00'0	0.00	3.33																
55	Adjusted G	Normal	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	17.80	0.00	0.50	0.50	0.25	2.00	14.93	17.80	5.00	2.00	30.00
y Use	Lo-Flow	Fittings	Yes	SəA	Yes	Yes	Yes	səA	Yes	Yes	Yes	Yes	Yes	Yes	A	S N	No	8 N	2	Yes	Yes	N _o	2	<u>0</u>													
eline Energy Use	a-Day	Cooking	Included	pepnjouj	pepnjouj	pepnjouj	pepnjouj	Included	Included	pepnjouj	pepnjouj	Included	00'0	3.33	3.33	3.33	3.33	0.00	Included	0.00	0.00	3.33															
DWH: Base	Gal/Capita	Normal	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	40.00	0.00	0.50	0.50	0.25	2.00	30.00	40.00	5.00	2.00	30.00
Actual	Temp	Deg F	135	140	140	140	140	140	140	140	140	140	140	145	145	140	140	140	140	140	140	140	140	140	140	140	140	•	135	135	160	140	140	140	120	110	140
	A N		3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2	60	350	17	6	우	6	01 80	7	7
Fac	ģ		16	P 41A	P 41B	P 42A	P 42B	P 43A	P 43B	P 44A	P 44B	P 45A	P 45B	P 46	P 47	P 51A	P 51B	P 52A	P 52B	P 53	P 54	P 55	P 56	P 57	P 58	P 59	P 60	S 79	P 80	P 81	P 101				P 116	T 120	

TABLE B-8 BASELINE DOMESTIC HOT WATER ENERGY USE CALCULATIONS

Fac		Actual	DWH: Base	seline Energy Use	y Use	55	Degree F CW Temp	W Temp	Added	Added Losses	Baseline DHW Energy Use	VEnergy Use	
o N	A N		Gal/Capita-Day	ita-Day	Lo-Flow	Adjusted (GPCD's	DHW Usage	Mil BTU/Yr		Fuel Oil	Propane	Electric
		Deg F	Normal	Cooking	Fittings	Normal	Cooking	Mil BTU/Yr	Tank	Pipe	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr
T 121	က	121	0.50	3.33	S N	0.50	3.33	12.47	9.0	6.2	-	45.13	1
	•	142	5.00	0.00	No	5.00	0.00	5.43	9.0	0.3	,	4	8,599
T 124	4	160	40.00	Included	N _o	40.00	pepnjoul	41.34	1.5	9.9	-	54.20	•
T 127	10	128	30.00	00.00	Yes	14.93	00'0	22.68	5.5	33.4	-	126.91	•
P 128	80	140	30.00	3.33	Yes	14.93	3.33	377.29	2.4	49.8	-	680.12	•
T 131	4	135	40.00	Ξ	N _o	40.00	Included	41.34	3.1	6.9	•	46.80	•
S 144	Ş	¥	0.50	3.33	2	0.50	3.33	00.00	0.0	0.0	•	0.00	-
S 146	2	•	0.00	0.00	ΑN	00'0	00'0	00'0	0.0	0.0	-		•
T 149	4	135	40.00	Included	9N	40.00	Included	38.90	3.1	6.7	•	46.80	,
T 156	e c	140	2.00	00:00	oN	2.00	0.00	1.63	9.0	0.0	•	,	979
T 158	C		800	000	¥	000	000	000	0.0	0.0	•	•	
T 161	12	•	0.0		¥	0.00	000	00.00	0.0	0.0		•	
T 162	Ξ	'	0.00		¥	0.00	0.00	0.00	0.0	0.0	•	•	
T 163	ž	'		•	¥	,	•	00.0	0.0	0.0	•	•	•
T 164	Ϋ́			•	Ϋ́	,	,	00.0	0.0	0.0	•	•	-
T 165	¥	ľ			ž	,	,	00.0	0.0	0.0	1	•	•
T 166	¥		,	-	Ϋ́	-	•	0.00	0.0	0.0	1	•	•
T 167	¥	•	-	•	ΑN		•	0.00	0.0	0.0	•	•	1
S 168	Not	•	0.00		ΝA	00.00	0.00	0.00	0.0	0.0	•	•	1
T 172		•	0.00		ΑN	0.00	0.00	0.00	0.0	0.0	•	•	-
P 177	4	•	0.00		A V	0.00		0.00	0.0	0.0	1	1	•
P 178	43	110	8.00	3.33	Yes	2.00	3.33	24.88	0.7	11.6	1	56.66	•
S 182	25	110			No	0.50		10.39	0.3	0.4		,	3,585
S 186	3	•	0.00		N	0.00		0.00	0.0	0.0	•	•	•
P 190	10	125	0.50		Yes	0.35		5.59	1.3	0.1	•	•	2,726
S 197	2	125	2.00	0.00	No	2.00	0.00	1.09	1.3	0.3	•	•	931
	5												•
S 198	2	•	0.00		AN	0.00	0.00	0.00	0.0	0.0	•	1	•
P 205	90	140			Yes	1.10		10.75	0.0	42.4	84.57	•	
P 205A	10	135	2.00		Yes	1.10	0.00	1.19	0.0	0.5	•	•	647
P 206	563	140	0.25		Yes	0.18	3.33	509.80	57.8	74.0	905.84	•	•
	563	180	0.00	3.33	No	0.00	2.00	0.00	0.0		•	1	1
P 207	80	145	.,		Yes	14.93	0.00	181.45	12.9	55.5	553.26	ı	•
P 207A		130	2.00		Yes	1.10	0.00	1.19	0.6	0.2	•	•	2776
P 208		140	30.00		Yes	14.93	0.00	204.13	12.9	55.5	575.93	,	•
P 208A	<u></u>	140	2.00	0.00	Yes	1.10	0.00	1.19	0.8	0.2	1	•	606

TABLE B-8 BASELINE DOMESTIC HOT WATER ENERGY USE CALCULATIONS

	Electric	kWH/Yr	67,115	•	•	•	٠	•	688	•	794	•	•	•	•	•		3,009		•	•	•	•	3,715	4,980	3,440		•	•	•		•		1,898
V Energy Use	Propane	Mil BTU/Yr	•	•	0.00	22.94	70.07		•	,	•	•	1	•	47.54	35.60	•	1			•	1	•	ı	•	•	•	1	61.52	1	62.38	•	819.77	
Baseline DHW Energy Use	Fuel Oil	Mil BTU/Yr	•	2,023.92	1	•	•	212.14	•	456.96	1	•	•	•	,	-		ı		•	•	•	•	•	•	•	•	•	•	•	•	٠	-	
osses	٤	Pipe	5.4	52.2	0.0	3.6	9.5	46.5	0.2	45.9	0.2	0.0	0.0	0.0	19.3	16.7	0.0	5.4		0.0	0.0	0.0	0.0	1.0	0.1	1.0	0.0	0.0	10.9	0.0	14.2	0.0	98.8	0.6
Added Losses	Mil BTU/Yr	Tank	1.2	6.5	0.0	1.7	4.0	10.8	9.0	10.8	9.0	0.0	0.0	0.0	9.6	0	0.0	9.0		0.0	0.0	0.0	0.0	2.9	13.4	1.2	0.0	0.0	3.3	0.0	6.1	0.0	12.8	0.5
W Temp	DHW Usage	Mil BTU/Yr	121.18	1,115.18	00'0	5.03	24.03	63.51	1.19	181.45	1.19	00.00	00.00	00.0	5.97	(10.96)	00.00	3.26		00.0	0.00	0.00	0.00	6.51	2.17	6.51	00.0	0.00	10.10	0.00	8.14	0.00	258.57	3.34
Degree F CW Temp	PCD's	Cooking	3.33	3.33	3.33	3.33	3.33	00.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	00'0		0.00	0.00	0.00	00.00	00.00	0.00	0.00	0.00	0.00	3.33	0.00	0.00	0.00	0.00	0.00
55	Adjusted GPCD's	Normal	1.10	120.00	0.50	0.35	4.58	14.93	1.10	14.93	1.10	0.00	00'0	00.0	1.10	50.00	0.00	2.00		0.00	0.00	0.00	0.00	5.00	5.00	5.00	00'0	0.00	1.10	0.00	5.00	0.00	14.93	1.10
y Use	Lo-Flow	Fittings	Yes	Yes	S N	Yes	Yes	Yes	Yes	Yes	Yes	NA	Ą	¥Z	Yes	No	NA	۷N		¥	NA	N A	NA	S No	No	<u>8</u>	NA	NA	Yes	A	N _O	NA	Yes	Xes
DWH: Baseline Energy Use	a-Day	Cooking	3.33	3.33	3.33	3.33	3.33	00.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	00'0		00.0	00'0	00'0	00.00	0.00	0.00	0.00	0.00	0.00	3.33	0.00	00'0	00'0	0.00	0.00
DWH: Bas	Gal/Capita-Day	Normal	2.00	120.00	0.50	05.0	12.00	30.00	2.00	30.00	2.00	0.00	00.0	0.00	2.00	50.00	0.00	2.00		0.00	00.00	0.00	0.00	5.00	2.00	5.00	0.00	0.00	2.00	0.00	2.00	0.00	30.00	2.00
Actual	Temp	Deg F	145	140	٧	130	120	130	120	129	130	-	•	•	122	160	•	120		1	•	•	•	120	135	125	1	•	140	•	135	•	128	132
	A N		180	35	NA	6	20	28	10	_		Ϋ́	ota	ᆫ	20	0	12	15	00	12	12	12	12	12	4	12	1	Š	15	Š	15	9	114	0,00
Fac	Ņ.		P 209	P 210	P 211	P 212	P 219	P 229	P 229A	P 230	P 230A	S 235	\$ 236	\$ 237	\$ 238		P 240	S 241		\$ 243	S 244	\$ 246	\$ 247	P 252	P 256	P 259	S 283	S 286	P 287	\$ 288	S 290	S 291	P 295	P 301

TABLE B-8 BASELINE DOMESTIC HOT WATER ENERGY USE CALCULATIONS

Fac		Actual	DWH: Base	seline Energy Use	y Use	55	Degree FC	55 Degree F CW Temp	Added	osses	Baseline DHV		
ò	Z Z	Temp	Gal/Capita-	ta-Day	Lo-Flow	Lo-Flow Adjusted GPCD's		DHW Usage Mil BTU/Yr	Mil BTU	٦٤	Fuel Oil	Propane	Г
		Deg F	Normal	Cooking	Fittings	Normal	Normal Cooking	Mil BTU/Yr Tank	Tank	Pipe	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr
P 642	25	130	24.00	00'0	Yes	8.93	00'0	33.91	2.5	15.6	-	116.70	•
S 2201	-	•	00'0	00'0	Ϋ́	00.0	00'0	0.00	0.0	0.0	•	-	٠
Totals			SUBTOTA	VLS, Willion	BTU/Year	S, Million BTU / Year (MW-Hr/Yr)		4,061	265	860	4,813	3,657	169,376
Gallons			SUBTOTAL	ALS, Gallons / Year	s / Year						34,698	39,738	

TABLE B-9 BUILDING BASELINE LIGHTING ENERGY USE SUMMARY

E	I	Δνοσ	1 = BLDG	USAGE	Default	ON-HOUS	CONNECTE	Baseline
Fac No	Installation Name	Area (SF)	USAGE	FACTOR		PER	LOAD	Energy
No.	I I I I I I I I I I I I I I I I I I I	(37)	FACTORE		Watts/SF	YEAR	Watts	kWH/Yr
T 6	Family Housing NCO & Enl	1,090	1	25%	1.5	874	1,635	2,381
	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
P 41A		1,937	1	25%	1.5	874	2,906	4,230
P 41B	Family Housing NCO & Enl Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
P 42A P 42B		1,937	1	25%	1.5	874	2,906	4,230
<u> </u>	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
P 43A P 43B	Family Housing NCO & Enl Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
P 44A		1,937	1	25%	1.5	874	2,906	4,230
P 44B	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
P 45A	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
P 45B	Family Housing NCO & Enl	2,089	1	25%	1.5	874	3,134	4,562
P 46	Family Housing CG & WO	2,089	1	25%	1,5	874	3,134	4,562
P 47	Family Housing NCO & Fol	1,937	1	25%	1.5	874	2,906	4,230
P 51A P 51B	Family Housing NCO & Enl Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
P 52A	Family Housing NCO & Enl	1,937	1	25%	1.5	874	2,906	4,230
		1,937	1	25%	1.5	874	2,906	4,230
P 52B P 53	Family Housing NCO & Enl Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
P 54	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
P 55	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
P 56	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
P 57	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
P 58	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
P 59	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
P 60	Family Housing CG & WO	2,089	1	25%	1.5	874	3,134	4,562
S 79	Post Office, Main	1,000	· · · · · · · · · · · · · · · · · · ·	25%	2.5	374	1,224	764
P 80	Exchange, Main Retail	9,093		25%	2.5	437	13,921	10,134
P 81	Theater with Dressing Rm's	6,719		25%	2.5	164	8,430	2,301
P 101	Open Din Cons (Hacienda)	6,171	1	25%	2.5	328	15,428	8,423
F 101	Club (Bar)	3046	'	25%	2.5		,	0
	Hacienda, East Rooms	4,721		25%	2.0			0
	Hacienda, West Rooms	8,273		25%	1.5			0
P 116	Exchange Service Station	1,126		25%	1.0	710	2,680	3,170
	(Non-shop areas)	662		25%	2.5			0
T 120	Fire Station - Office	3,636		90%	2.5	4,659	28,365	148,678
1 120	Fire Station - Dorm	2,653		60%	2.0	.,		0
	Fire Station - Garage	4,949		90%	1.0			0
T 121	Bowling Center	4,952		90%	2.5	2,912	7,204	23,600
' '-'	bowing contain	628		90%	1.0	_,-	Ĺ	0
T 124	Family Housing LC & MJ	2,001	1	25%	1.5	874	3,002	4,370
T 127	Officers Quarters Military	2,250		60%	2.0	3,203	2,560	8,946
P 128	Officers Quarters Military	20,196	1	60%	2.0	3,203	40,392	141,146
T 131	Family Housing CG & WO	998	1	25%	1.5	874	1,497	2,180
S 144	Gymnasium	7,172	· · · · · · · · · · · · · · · · · · ·	80%	2.5	0	2,841	0
S 146	FE Facility	4,042		90%	1.0	1,872	2,459	5,179
T 149	Family Housing NCO & Enl	1,196		25%	1.5	874	772	1,124
T 156	FE Facility - Shop	1,753		90%	1.0	1,872	4,362	9,186
"	FE Facility - Office	497		90%	2.5			0
T 158	Vehicle Storage	1,859		90%	1.0	0	666	0
T 161	Admin General Purpose	2,250		90%	2.5	1,872	4,104	8,643
T 162	Elec Maint. Shop	2,250		90%	1.0	1,872	2,404	5,063
T 163	Officers Quarters Military	2,250		60%	2.0	1,287	2,404	3,375
T 164	Admin General Purpose	2,250		90%	2.5	1,872	2,404	5,063
T 165	Admin General Purpose	2,250		90%	2.5	1,872	2,404	5,063
T 166	Officers Quarters Military	2,250		60%	2.0	1,287	2,404	3,375
T 167	Officers Quarters Military	2,250		60%	2.0	1,287	2,404	3,375
S 168	General Purp Warehouse	6,560		90%	1.0	0	1,374	0
T 172	Cold Storage Warehouse	800		90%	1.0			0
P 177	Technical Library	3,599		90%	2.5	1,872	7,620	16,048
P 178	Child Development Cntr	3,599	1	85%	2.0	2,340	7,198	19,089
h. 170	Lating paralobiliant out	, 0,000	' '		, -· ·	_,-, 1		, ,

TABLE B-9 BUILDING BASELINE LIGHTING ENERGY USE SUMMARY

Fac		Area	1 = BLDG	USAGE	Default	ON-HOUR	CONNECTE	Baseline	
No.	Installation Name	(SF)	USAGE	FACTOR	Density	PER	LOAD	Energy	
		, ,	FACTORE	%	Watts/SF	YEAR	Watts	kWH/Yr	
S 182	Commissary	3,000		95%	3.0	1,664	12,672	25,040	
S 186	Sup Svc Admin Bldg	1,920		90%	2.5	1,872	5,328	11,221	
P 190	Post Chapel	2,720		20%	0.3	473	3,437	3,253	
S 197	Admin Bldg R&D - Office	2,100		90%	2.5	1,872	16,885	35,560	
	Admin Bldg R&D - Electronics	6,062		90%	1.0			0	
S 198	General Inst Bldg	1,090		90%	2.5	1,664	2,116	3,961	
P 205	Admin General Purpose	35,820	——	90%	2.5	3,328	24,262	90,837	
	Company HQ Building	5,161	1 1	90%	2.5	2,080	12,903	30,192	
P 206	Enlisted Pers Dining Fac	16,768	-	60%	2.5	4,368	8,208	43,023	
	Kitchen Area - Scullery	,						0	
P 207	Enl Barracks w/o Dining	35,820		60%	2.0	3,203	24,062	84,082	
H	Company HQ Building	5,161	1	90%	2.5	2,080	12,903	30,192	
P 208	Enl Barracks w/o Dining	35,820		60%	2.0	3,203	24,262	84,781	
1	Company HQ Building	5,161	1	90%	2.5	2,080	12,903	30,192	
P 209	AAFES Snack Bar	3,320		50%	2.5	1,092	4,158	7,568	
	Hith/Dntl Clinic w/ Beds	10,973		95%	2.0	6,989	15,192	126,081	
P 211	Outdoor Swimming Pool	-		80%	2.5			0	
P 212	Gymnasium	8,907		80%	2.5	2,803	10,479	33,566	
P 219	Physical Fitness Center	3,212	1	80%	2.5	2,402	8,030	25,722	
P 229	Enl Barracks w/o Dining	40,915		60%	2.0	3,203	24,262	84,781	
1 1	Company HQ Building	5,161	1	90%	2.5	2,080	12,903	30,192	
P 230	Enl Barracks w/o Dining	35,820		60%	2.0	3,203	24,262	84,781	
1 1	Company HQ Building	5,161	1	90%	2.5	2,080	12,903	30,192	
	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
S 236	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
S 237	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
S 238	Sig Photo Lab	14,548		90%	2.5	2,080	22,304	52,191	
P 240	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
S 241	GM Facility	10,000		90%	2.5	2,080	18,004	42,129	
	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
S 244	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
S 246	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
S 247	Admin General Purpose	3,000		90%	2.5	2,080	4,608	10,783	
P 252	Vehicle Maint Shop DS	12,299	1	90%	1.0	2,080	12,299	28,780	
P 256	Vehicle Maint Shop ORG	5,294	1	90%	1.0	2,080	5,294	12,388	
P 259	Vehicle Maint Shop ORG	13,667	1	90%	1.0	2,080	13,667	31,981	
S 283	FE Maintenance Shop	4,000		90%	1.0	2,080	3,894	9,112	
S 286	Admin General Purpose	3,000		90%	2.5	1,872	4,608	9,704	
P 287	Recreation Building	5,584		50%	2.5	983	9,526	15,604	
S 288	General Purpose Warehouse	3,000		90%	1.0	1,872	4,608	9,704	
	Electron Equip Facility	14,856		90%	1.0	1,872	18,648	39,273	
S 291	Cont Humid Warehouse	7,400	1	90%	1.0	1,872	7,400	15,584	
	Eni Barracks w/o Dining	46,593		90%	2.0	4,659	22,500	117,936	
P 301	ADP Building	10,800		90%	2.5	1,872	21,844	46,003	
	Detached Latrine/Shower	995		90%	1.0	1,213	720	983	
	Control Tower - Range SPT	891		90%	2.5	0	288	0	
Building Totals 718,765									
Exterior/Street Lighting									
Total Lig								2,155,567	

TABLE B-10 PROCESS ELECTRIC ENERGY USE SUMMARY

		Aron	Eacility	l Hiliz	ation Fa	ectors	1	PROCESS E	NERGY U	SAGE
Fac		Area		PN	Days	Meals	ŀ			Cooking & Other
No.	installation Name	(SF)	Usage Code	FIN	/Week					Prop Mil BTU/Yr
	NOO . F-1	1.090	10	3	7	15		5,900	Included	10.5
T 6	Family Housing NCO & Enl	1,397	10	4	7	12		5,900	Included	10.5
P 41A	Family Housing NCO & Enl	1,937	10	4	7	12	H	5,900	Included	10.5
P 41B	Family Housing NCO & Enl		10	4	7	12		5,900	included	10.5
P 42A	Family Housing NCO & Enl	1,937	10	4	7	12		5,900	Included	10.5
P 42B	Family Housing NCO & Enl	1,937	10	4	7	12		5,900	Included	10.5
P 43A	Family Housing NCO & Enl	1,937	10	4	7	12	l	5,900	Included	10.5
P 43B	Family Housing NCO & Enl	1,937	_	4	7	12	П	5,900	included	10.5
P 44A	Family Housing NCO & Enl	1,937	10	4	7	12	Н	5,900	Included	10.5
P 44B	Family Housing NCO & Enl	1,937			7	12		5,900	Included	10.5
P 45A	Family Housing NCO & Enl	1,937	10	4	7	12		5,900	Included	10.5
P 45B	Family Housing NCO & Enl	1,937	10	4	7	12		5,900	Included	10.5
P 46	Family Housing CG & WO	2,089	10	4	7	12	l		Included	10.5
P 47	Family Housing CG & WO	2,089	10	4	7			5,900		10.5
P 51A	Family Housing NCO & Enl	1,937	10	4	<u> </u>	12		5,900	Included	10.5
P 51B	Family Housing NCO & Enl	1,937	10	4	7	12 12		5,900 5,900	Included	10.5
P 52A	Family Housing NCO & Enl	1,937	10	4	7		ŀ		Included	10.5
P 52B	Family Housing NCO & Enl	1,937	10	4	7	12 12	l	5,900 5,900	Included	10.5
P-53	Family Housing CG & WO	2,089	10	4	7	12		5,900	Included	10.5
P 54	Family Housing CG & WO	2,089	10	4	7	12		· · · · · · · · · · · · · · · · · · ·	Included	10.5
P 55	Family Housing CG & WO	2,089	10	4	7	12		5,900 5,900	Included	10.5
P 56	Family Housing CG & WO	2,089	10	4	7					10.5
P 57	Family Housing CG & WO	2,089	10	4		12	H	5,900 5,900	Included	10.5
P 58	Family Housing CG & WO	2,089	10	4	7	12			Included	10.5
P 59	Family Housing CG & WO	2,089	10	4	7	12	ı	5,900 5,900	Included	
P 60	Family Housing CG & WO	2,089	10	4	7	12			Included	10.5
S 79	Post Office, Main	1,000	8	2	6	0	l	1,700	0	<u> </u>
P 80	Exchange, Main Retail	9,093	8	60	7	0		112,084 1,058	0	
P 81	Theater with Dressing Rm's	6,719	6	350	7	120	Н	1,036	39,420	
P 101	Open Din Cons (Haclenda)	6,171	7	17 9	7	10		6,092	5,475	-
	Club (Bar)	3046	9	10	7	10		4,000	3,473	•
1	Hacienda, East Rooms	4,721	3	9	7	9		5,900	included	10.5
	Hacienda, West Rooms	8,273	10	2	7	0		481	III Gadaea	
P 116	Exchange Service Station	1,126	2.01	8	7	0		1,126	0	•
	(Non-shop areas)	662	8		7			3,291		
T 120	Fire Station - Office	3,636	1	7	7	21		2,800	6,899	-
1	Fire Station - Dorm	2,653	4	7	0	0		134	J,033 -	•
	Fire Station - Garage	4,949	2.02	20	5	10		4,482	5,475	•
T 121	Bowling Center	4,952	5	30	5	"		13,144	3,713	-
		628	2.01	 	7	12	i	5,900	Included	10.5
T 124	Family Housing LC & MJ	2,001	10	10	7	0		4,000	ii icidaea	10.5
T 127	Officers Quarters Military	2,250	3	10		160		32,000	52,560	
P 128	Officers Quarters Military	20,196	4	80	7	12		5,900		
T 131	Family Housing CG & WO	998	10			0	1	6,491	0	
S 144	Gymnasium	7,172	2.01	No 5		0	ł	1,727		
S 146	FE Facility	4,042	2.01	4	7	12	1	5,900	Included	10.5
T 149	Family Housing NCO & Enl	1,196	10	3	5	0	1	749	"Iodueu	- 10.5
T 156	FE Facility - Shop	1,753	2.01	0	0	-		450	-	
	FE Facility - Office	497	0.00	0	1 0	0	ł	50		
T 158	Vehicle Storage	1,859	2.02	<u> </u>			ł	2,036		
T 161	Admin General Purpose	2,250	0.01	12	5	0	1	961		
T 162	Elec Maint. Shop	2,250	2.01	11	_		ı	NA NA		<u> </u>
T 163	Officers Quarters Military	2,250	3	NA	1 2	i ww	•	I NA	-	•

TABLE B-10 PROCESS ELECTRIC ENERGY USE SUMMARY

Fac		Area	Facility	Utiliz	ation F	actors		PROCESS E	NERGY U	SAGE
No.	Installation Name	(SF)	Usage		Days					Cooking & Other
NO.	It istaliation in the	(0,)	Code		/Week				-	Prop Mil BTU/Yr
T 164	Admin General Purpose	2,250	1	NA	5	NA.		2.036	-	-
T 165	Admin General Purpose	2,250	1	NA	5	NA		2,036	-	-
	Officers Quarters Military	2,250	3	NA	5	NA.		NA	-	
T 166	Officers Quarters Military	2,250	3	NA	5	NA.		NA		-
T 167		6.560	2.02		t in Use			178		•
S 168	General Purp Warehouse	800	2.02	- 140	7	0		22	•	
T 172	Cold Storage Warehouse	3,599	1	4	5	ō		3,257		
P 177	Technical Library	3,599	11.3	43	5	31		272	10.184	
P 178	Child Development Cntr	3,000	8.1	25	5	0		172,782	70,104	-
S 182	Commissary	1,920	1	3	5	0		1,738		
S 186	Sup Svc Admin Bidg		6	10	7	3		1,058	1.643	-
P 190	Post Chapel	2,720		5	5	0		1,901	1,0-0	
S 197	Admin Bidg R&D - Office	2,100	1	_	5	0		2,589	•	•
2 1 2 2	Admin Bldg R&D - Electronics	6,062	2.01	5	4	0	Н	2,589 986	-	-
S 198	General Inst Bidg	1,090	1	90	5	<u> </u>		32,417		·
P 205	Admin General Purpose	35,820	1		1	•			•	-
-	Company HQ Building	5,161	1	10	5			4,671	184,946	-
P 206	Enlisted Pers Dining Fac	16,768	7	563	7	563 563		0	104,940	-
	Kitchen Area - Scullery	05.000	7	563	7	563		32,000		
P 207	Enl Barracks w/o Dining	35,820	3	80	5	- 1			•	•
	Company HQ Building	5,161	1	10		0		4,671	-	•
	Eni Barracks w/o Dining	35,820	3	90	7	· •		36,000	•	-
	Company HQ Building	5,161	1	10	5	100		4,671	00 550	-
P 209	AAFES Snack Bar	3,320	9	180	7	180		6,640	98,550	-
P 210	Hith/Dnti Clinic w/ Beds	10,973	12.1	35	7	9		37,308	2,957	•
P 211	Outdoor Swimming Pool		5	NA	7 D/W	0	1	0 001	<u>0</u>	•
P 212	Gymnasium	8,907	5	9	7	0		8,061		
P 219	Physical Fitness Center	3,212	5.1	20	7			2,907	•	-
P 229	Eni Barracks w/o Dining	40,915	3	28	7	0		11,200	-	•
	Company HQ Building	5,161	1	10	5	0		4,671	-	•
P 230	Eni Barracks w/o Dining	35,820	3	80	7	0		32,000	•	•
	Company HQ Building	5,161	1	10	5	0		4,671 2,715		•
S 235	Admin General Purpose	3,000	1	NA					· · · · · · · · · · · · · · · ·	
S 236	Admin General Purpose	3,000	1	NA	5	0		2,715 2,715	-	-
S 237	Admin General Purpose	3,000	1	NA	5	0		13,166		
S 238	Sig Photo Lab	14,548	1	50	3	"		16,425	•	•
	Process	0.000		40	5	0		2,715	0	•
P 240	Admin General Purpose	3,000	1	12					0	<u>•</u>
S 241	GM Facility	10,000	1	15	5	0		9,050	U	•
		1								<u>-</u>
			<u> </u>	42	-	<u> </u>		0.715	^	<u> </u>
S 243	Admin General Purpose	3,000	1	12	5	0		2,715	0	-
S 244	Admin General Purpose	3,000	1	12	5	0		2,715	0	-
S 246	Admin General Purpose	3,000	1	12	5	0		2,715	0	-
S 247	Admin General Purpose	3,000	1	12	5	0		2,715	0	•
P 252	Vehicle Maint Shop DS	12,299	2.01	12	5	0		5,254	0	-
P 256	Vehicle Maint Shop ORG	5,294	2.01	4	5	0		2,261	0	-
P 259	Vehicle Maint Shop ORG	13,667	2.01	12	5	0		5,838	0	•
S 283	FE Maintenance Shop	4,000	2.01	1	5	0		1,709	0	-
L								<u> </u>		-
S 286	Admin General Purpose	3,000	1	NA	5	0		2,715	0	
P 287	Recreation Building	5,584	9	15	7			11,168	0	•
S 288	General Purpose Warehouse	3,000	2.02	NA	5	0	ı	81	0	-

TABLE B-10 PROCESS ELECTRIC ENERGY USE SUMMARY

Fac		Area	Facility	/ Utiliz	ation F	actors
No.	Installation Name	(SF)	Usage	PN	Days	Meals
,		` '	Code		/Week	/Day
S 290	Electron Equip Facility	14,856	2.01	15	5	0
S 291	Cont Humid Warehouse	7,400	2.01	6	5	0
P 295	Eni Barracks w/o Dining	46,593	3	114	7	0
P 301	ADP Building	10,800	1	20	7	0
P 642	Detached Latrine/Shower	995	3.1	25	7	0
S 2201	Control Tower - Range SPT	891	1	1	Few	0
Totals						

PROCESS ENERGY USAGE						
Process	Cooking	Cooking & Other				
kW-Hr/Yr	kW-Hr/Yr	Prop Mil BTU/Yr				
6,346	0	•				
		-				
3,161	0					
45,600	0	•				
9,774	0	-				
495,272		-				
		-				
0	0	-				
806	0	•				
1,431,044	408,107	304.5				

TABLE B-11 ESTIMATED ENERGY USE VERSUS RECORDED ENERGY USE

Description	Amount	Units
FY91 Heating Fuel Oil Deliveries	24,648	Mil BTU/Yr
Baseline Simulated Fuel Oil Use	21,797	Mil BTU/Yr
Difference for Heating Fuel Oil	-11.6%	
FY91 Adjusted Propane Deliveries	20,963	Mil BTU/Yr
Baseline Simulated Propane Use	18,337	Mil BTU/Yr
Difference for Propane (See Note)	-12.5%	
FY91 Electricity Usage		
Main Garrison Account	10,738,601	kWH/Yr
Water Pump Account	136,240	kWH/Yr
T376 Account	11,815	kWH/Yr
T6 Account	11,731	kWH/Yr
Total FY91 Electricity Use	10,898,387	kWH/Yr
Baseline Simulated Electricity Use	9,893,823	kWH/Yr
Difference for Electricity	-9.2%	
•		

Note: Propane delivery records were only made available for the period between 6 November 1991 and 31 August 1992. These delivery records were normalized to a full year using the ratio of 65 Degree F based Heating Degree Hours in the period of record.

TABLE B-12
LIGHTING ENERGY USE CALCULATION METHODOLOGY

Function	Description of Usage	Usage	Lighting
Code	2000	Factor	Watts/SF
1	Offices	90%	2.5
2	Shops and Warehouses	90%	1.0
2.1	Commercial Laundries	90%	2.0
3	Barracks & Quarters w/o Dining	60%	2.0
3.1	Detached Latrine with Bathing	90%	1.0
4	Barracks & Quarters with Dining	60%	2.0
5	Recreation & Gyms w/o Bathing	80%	2.5
5.1	Recreation & Gyms with Bathing	80%	2.5
6	Theaters / Community Facilities	20%	2.5
7	Dining Facilities, all uses	60%	2.5
8	Base Exchanges & Stores	95%	2.5
8.1	Commissaries	95%	3.0
9	Clubs, Officers, NCO, Enl PN	50%	2.5
10	Family Housing	25%	1.5
. 11.1	Schools w/o Bathing	85%	3.0
11.2	Schools with Bathing	85%	3.0
11.3	Child Development Centers	85%	2.0
12	Medical Facilities, Clinics	95%	2.0
12.1	Medical Facilities, Hospitals	95%	2.0
13	Multiple Usage Buildings	95%	2.0

LIGHTING ENERGY USE CALCULATIONS

Lighting energy use for EEAP buildings at Fort Hunter Liggett is determined based on a combination of field observations, design data and experience in similar projects. Baseline lighting energy use is calculated as follows:

Buildings with complete lighting system take-offs tabulated:

The building schedule is evaluated to determine schedule on-time hours per year. The watts per fixture (listed separately by fixture type) are multiplied by the sheduled on-hours per year and a utilization (diversity) factor. Electrical energy use is recorded in kWH/Yr. The building connected lighting load is determined by summing the connected loads of all tabulated fixtures.

Buildings with only candidate retrofit lighting fistures tabulated:

Several building lighting system tabulations are limited to listing only those fixtures which are candidates for retrofit. For these buildings, lighting energy usage and connected loads are determined based on lighting densities and utilization factors normally associated with the building's function.

TABLE B-13 PROCESS ELECTRIC ENERGY USE SUMMARY

PROCESS ENERGY USE FACTORS

Usage	Description	Process Electric Use		Cooking	Propane
Code	·	kWH/Unit-Yr	Unit	kWH/Meal	Mil BTU/Yr
1	Offices & Administratio	0.91	SF	-	-
2.01	Shops & Warehouses:	0.43	SF	-	•
2.02	Shops & Warehouses:	0.03	SF	-	•
2.10	Laundry - Commercial	Separate Ca	ics.		•
3	Barracks & Quarters w/	400	PN	-	•
3.1	Detached Latrine Buildi	0	NA	-	•
4	Barracks & Quarters wi	400	PN	0.90	•
5	Recreation Facilities	0.91	SF	1.50	-
5.1	Gymnasiums	0.91	SF	-	-
6	Theaters & Assembly F	1,058	Facility	1.50	-
7	Dining Facilities: All El	included with	meais	0.90	•
8	Base Exchanges & Sto	1.70	SF	1.50	•
8.1	Commissaries	3.50	SF	1.50	•
9	Clubs: Officers & NCO	2.00	SF	1.50	•
10	Family Housing, Includ	5,900	Facility,	included	10.5 Mil BTU/Yr
11	Schools	2.30	SF	0.90	•
11.3	Child Development Ce	272	Facility	0.90	•
12	Medical Facilities, Clini	-	-	0.90	•
12.1	Clinics with Beds	3.40	SF	0.90	•

PROCESS ENERGY USAGE FACTORS

Usage Code 1: Offices & Administration

Equipment typically includes: Typewiters, coffee pots, vending machines, some copy machines, microwaves, personal computers and prionters.

Based on equipment loads and diversity of use, a small office (about 5,000 SF or less) without a copy machine or personal computers will consume about 500 kW-Hr/Yr of electric power.

Additional power use for personal computers is esimated at about 150 kW-Hr/Yr per unit [Newsham, G.R., et all, "A Case Study of the Energy Consumption of Desktop Computers", IEEE Publication Number 0- 7803- 0634- 1/92\$03.00.] Almost all offices are equipped with personal computers. Each office uses about 200 SF of office-building floor area.

Additional power consumption by microwave ovens is estimated at 275 kW-Hr/Yr assuming an average 750 Watt oven, used a total of 1.5 Hr/Day, 5 Days/Week.

A larger office, equipped with a copy machine is estimated to consume an additional 1,000 kW-Hr/Yr.

Thus, for offices 5,000 SF or smaller, electric use is estimated at:

500	kW-Hr/Yr, plus
150	kW-Hr/Yr per 200 SF @ PC's, and
275	kW-Hr/Yr per 5,000 SF @ microwave ovens
0.91	kW-Hr/Yr-Office SF

DOMESTIC HOT WATER TANK & PIPING HEAT LOSS CALCULATIONS

Piping losses for non circulated and circulated systems are determined in the following calculations:

Losses from Non-Circulated Domestic Hot Water Systems

Losses are experienced only as a result of hot water use. Water initially in the pipes is wasted waiting for hot water to arrive, and hot water in the pipes after the use is completed cools. Thus, each time hot water is used, twice the energy needed to heat the volume of water in piping is lost. Heat loss calculations are based on a number of assumed uses per day (dependant on building type), the volume of water contained in piping systems and the temperature of the water.

Family Housing Buildings:

Average 3/4" pipe, 40 foot run =

0.29 Gallons

Average 4 uses per day per person, thus:

4 PN x 4 uses x .29 Gallons x 2 =

3,413 Gallons/Year

Lost Domestic Hot Water Heat

Stores and Other Community Facilities

Toilets in public access buildings are used by employees and customers. Employees are assumed to have 3 uses per day each and customers are assumed to have one use per 5 customers.

Average 3/4" pipe, 20 foot run =

0.15 Gallons

Average use for employees:

1 PN x 3 uses x .15 Gallons x 2 =

320 Gallons/Employee-Year

Lost Domestic Hot Water Heat

Average Use for Customers:

1 PN x 1/5 uses x .15 Gallons x 2 =

21.3 Gallons/Customer-Year

Lost Domestic Hot Water Heat

Building 6:

Insulation Repairs needed; add to load calculated for Family Housing:

15 LF Pipe

0.75 inch Dia, Bare Pipe

590.00 BTUH/10LF

7.75 Mil BTU/Yr Added Load

Building 80:

Insulation Repairs needed; add to load calculated for normal use for stores:

15 LF Pipe

0.75 inch Dia, Deteriorated Insulation, same as Bare Pipe

590.00 BTUH/10LF

7.75 Mil BTU/Yr Added Load

Building 101

Dining Area Water Heater: ~75 LF 1 inch pipe; 50 uses per day

3.06 Gallons

160 Deg F

2,683 BTU Lost per Use

33.5 Mil BTU/Yr Load Lost

Added losses will result from A/C System type insulation on about 75 LF of 1 inch dia piping. Recommend it be replaced with proper insulation for exterior hot water piping.

Bar Area Water Heater Piping: ~20 LF 3/4 inch pipe; 20 uses per day

0.46 Gallons

140 Deg F

326 BTU Lost per Use

1.6 Mil BTU/Yr Load Lost

Rooms - East Area Water Heater Piping: ~50 LF 1 inch pipe; 3 uses per day per PN.

2.04 Gallons

140 Deg F

1,448 BTU Lost per Use

1.6 Mil BTU/Yr Load Lost

Rooms - West Area Water Heater Piping: ~112 LF 1 inch pipe; 3 uses per day per PN.

4.57 Gallons

120 Deg F

2,480 BTU Lost per Use

2.7 Mil BTU/Yr Load Lost

35 LF of 3/4 inch Bare pipe should be insulated: losses are based on uses for 3 hours per day

35 LF,

140 Deg F,

100 BTUH/10L

0.38 Mil BTU/Y

Building 120:

Insulation Repairs needed; add to load calculated for normal use for stores:

15 LF Pipe

0.75 inch Dia, Bare Pipe

25 LF Pipe

0.75 inch Dia, Deteriorated Insulation, same as Bare Pipe

310.00 BTUH/10LF

4.07 Mil BTU/Yr Added Load

60.00 BTUH/10LF

1.31 Mil BTU/Yr Added Load

Total @

110 Deg F HW Temperature:

5.39 Mil BTU/Yr Added Load

15 LF Pipe

0.75 inch Dia, Bare Pipe

25 LF Pipe

0.75 inch Dia, Deteriorated Insulation, same as Bare Pipe

550.00 BTUH/10LF

7.23 Mil BTU/Yr Added Load

120.00 BTUH/10LF

2.63 Mil BTU/Yr Added Load

Total @

140 Deg F HW Temperature:

9.86 Mil BTU/Yr Added Load

Building 121:

Kitchen Area: 50

uses per day,

20 LF

1 inch pipe

0.82 Gallons

121 Deg F

450 BTU Lost per Use

8.2 Mil BTU/Yr Load Lost

Building 124:

Insulation Repairs needed; add to load calculated for normal use:

10 LF Pipe

0.75 inch Dia, Bare Pipe

480.00 BTUH/10LF

4.20 Mil BTU/Yr Added Load

Building 127:

Water Heater Piping: ~50 LF 1 inch pipe; 3 uses per day per PN.

2.04 Gallons

128 Deg F

1,244 BTU Lost per Use

1.4 Mil BTU/Yr Load Lost/PN

Note: Building 127 DHW pipe insulation repairs are needed for 50 LF of 1-inch supply piping.

Additional heat losses from these pipes are:

Supply @ 128 Deg F, 1-inch Pipe

550 BTUH/10LF Bare

90 BTUH/10L

Total Heat Losses

24.09 Mil BTU/Y

Building 131:

Insulation Repairs needed; add to load calculated for normal use:

10 LF Pipe

0.75 inch Dia, Bare Pipe

510.00 BTUH/10LF

4.47 Mil BTU/Yr Added Load

Building 149:

Insulation Repairs needed; add to load calculated for normal use:

10 LF Pipe

0.75 inch Dia, Bare Pipe

510.00 BTUH/10LF

4.47 Mil BTU/Yr Added Load

Building 156: 0.5 inch Dia 10 LF Pipe 3 Uses per day/PN, 0.02 Mil BTU/Yr Added Load 0.04 Gallons **Building 190:** 0.5 inch Dia 20 LF Pipe 1 Uses per day/PN, 0.17 Mil BTU/Yr Added Load 0.08 Gallons Building 197: inch Dia 30 LF Pipe 3 Uses per day/PN, 0.72 Mil BTU/Yr Added Load 0.49 Gallons Buildings 205A, 207A, 208A, 229A and 230A: inch Dia 15 LF Pipe 0.75 3 Uses per day/PN, inch Dia 0.5 10 LF Pipe Gallons 0.18 Temp Bldg PN 0.30 Mil BTU/Yr Added Load 205A 10 135 0.28 Mil BTU/Yr Added Load 207A 10 130 0.32 Mil BTU/Yr Added Load 140 208A 10 0.24 Mil BTU/Yr Added Load 120 229A 10 0.28 Mil BTU/Yr Added Load 130 10 230A Building 209: inch Dia 60 LF Pipe 0.2 Uses per PN-Day 19.39 Mil BTU/Yr Added Load 0.98 Gallons **Building 212:** inch Dia 20 LF Pipe 0.75 1 Uses per PN-Day 0.36 Mil BTU/Yr Added Load 0.18 Gallons Insulation Repairs needed: 8 LF Pipe 0.75 inch Dia, Bare Pipe

470.00 BTUH/10LF

Total Present Load Losses:

3.29 Mil BTU/Yr Added Load

3.66 Mil BTU/Yr Added Load

5

Building 219:

1 Uses per PN-Day

50 LF Pipe

1 inch Dia

0.82 Gallons

3.24 Mil BTU/Yr Added Load

Insulation Repairs needed:

10 LF Pipe

2 inch Dia, Bare Pipe

800.00 BTUH/10LF

7.01 Mil BTU/Yr Added Load

Total Present Load Losses:

10.25 Mil BTU/Yr Added Load

Building 241:

3 Uses per PN-Day

20 LF Pipe

0.5 inch Dia

0.08 Gallons

0.73 Mil BTU/Yr Added Load

Insulation Repairs needed:

20 LF Pipe

0.5 inch Dia, Bare Pipe

310.00 BTUH/10LF

5.43 Mil BTU/Yr Added Load

Total Present Load Losses:

6.16 Mil BTU/Yr Added Load

Building 252:

3 Uses per PN-Day

20 LF Pipe

0.75 inch Dia

0.18 Gallons

1.31 Mil BTU/Yr Added Load

Building 256:

3 Uses per PN-Day

10 LF Pipe

0.5 inch Dia

0.04 Gallons

0.12 Mil BTU/Yr Added Load

Building 259:

3 Uses per PN-Day

20 LF Pipe

0.75 inch Dia

0.18 Gallons

1.41 Mil BTU/Yr Added Load

Building 287:

3 Uses per PN-Day

88 LF Pipe

0.75 inch Dia

3 Uses per PN-Day

20 LF Pipe

0.5 inch Dia

0.81 Gallons 0.08 Gallons 9.44 Mil BTU/Yr Added Load 0.95 Mil BTU/Yr Added Load

Insulation Repairs needed:

10 LF Pipe

0.75 inch Dia, Bare Pipe

550.00 BTUH/10LF

4.82 Mil BTU/Yr Added Load

Total Present Load Losses:

15.21 Mil BTU/Yr Added Load

Building 301:

3 Uses per PN-Day

15 LF Pipe

0.5 inch Dia

0.06 Gallons

0.86 Mil BTU/Yr Added Load

Losses from Circulating Domestic Hot Water Systems

Heat loss calculations are based on takeoffs from building plans, field inspections of piping condition and DHW temperature. Heat losses are determined from Figure 8-47, Architects and Engineers Guide to Energy Conservation in Existing Buildings, February 1980, U.S. DOE.

Building 120

Pipe Dia	Length LF	Effective Insul IN	DHW Temp	Heat Loss BTUH/10	Total Loss Mil BTU/Y
1/2	90	1	140	87	6.9
3/4	90	1	140	88	6.9

Building 128

Pipe	Length	Effective	DHW	Heat Loss	Total Loss
Dia	LĚ	Insul IN	Temp	BTUH/10	Mil BTU/Y
3	20	1	140	363	6.4
2	90	1	140	175	13.8
1-1/2	118	1	140	138	14.2
1	88	1	140	100	7.7
3/4	270	1	120	75	17.7

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (140 - 80) / (140 - 68) =

0.83

Building 178

ĺ	Pipe Dia	Length LF	Effective Insul IN		Heat Loss BTUH/10	
Ì	3/4	200	1	110	48	8.3
١	1/2	200	1 1	90	45	7.9

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (110 - 80) / (110 - 68) =

0.71

Buildings 205, 207 & 208

Γ	Pipe	Length	Effective	DHW	Heat Loss	Total Loss
1	Dia	LF	Insul IN	Temp	BTUH/10	Mil BTU/Y
Ì	1	180	1	140	100	15.8
1	3/4	180	1	140	75	11.8
۱	1/2	90	1	140	87	6.9
1	3/4	150	1	120	75	9.9
1	1/2	150	1	120	50	6. 6

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (140 - 80) / (140 - 68) =

0.83

Note: Buildings 207 and 208 DHW pipe insulation repairs are needed for 10 LF of 2-inch supply and 3/4 inch return piping.

Additional heat losses from these pipes are:

Supply @ 140 Deg F, 2-inch Pipe Return @ 120 Deg F, 3/4-inch Pipe 1,110 BTUH/10LF Bare 390 BTUH/10LF Bare 180 BTUH/10LF 1-inch In 75 BTUH/10LF 1-inch In 13.14 Mil BTU/Yr Added Lo

Total Heat Losses

390 BTUH/10LF Bare 1,500 BTUH/10LF Bare

Building 229

Pipe	Length	Effective	DHW	Heat Loss	Total Loss
Dia	ĿĔ	insui iN	Temp	BTUH/10	Mil BTU/Y
1	180	1	130	90	14.2
3/4	180	1	130	80	12.6
1/2	90	1	130	60	4.7
3/4	150	1	110	48	6.3
1/2	150	1	110	47	6.2

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (130 - 80) / (130 - 68) =

0.81

Note: Building 229 DHW pipe insulation repairs are needed for 10 LF of 2-inch supply and 3/4 inch return piping.

Additional heat losses from these pipes are:

Supply @ 130 Deg F, 2-inch Pipe Return @ 110 Deg F, 3/4-inch Pipe Total Heat Losses 940 BTUH/10LF Bare 320 BTUH/10LF Bare 1,260 BTUH/10LF Bare 170 BTUH/10LF 1-inch In 48 BTUH/10LF 1-inch In 11.04 Mil BTU/Yr Added Lo

Building 230

Pipe Dia	Length LF	Effective Insul IN	DHW Temp	Heat Loss BTUH/10	Total Loss Mil BTU/Y
1	180	1	129	89	14.0
3/4	180	1	129	79	12.5
1/2	90	1	129	59	4.7
3/4	150	1	109	47	6.2
1/2	150	1	109	46	6.0

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (129 - 80) / (129 - 68) =

0.80

Note: Building 230 DHW pipe insulation repairs are needed for 10 LF of 2-inch supply and 3/4 inch

return piping.

Additional heat losses from these pipes are:

Supply @ 129 Deg F, 2-inch Pipe Return @ 109 Deg F, 3/4-inch Pipe Total Heat Losses 939 BTUH/10LF Bare 319 BTUH/10LF Bare 1,258 BTUH/10LF Bare 169 BTUH/10LF 1-inch In 47 BTUH/10LF 1-inch In 11.02 Mil BTU/Yr Added Lo

Building 206

Г	Pipe	Length	Effective	DHW	Heat Loss	Total Loss
	Dia	LF	insul IN	Temp	BTUH/10	Mil BTU/Y
H	2	300	1	140	175	46.0
	1-1/2	25	1	140	138	3.0
	1	30	1	140	100	2.6
	3/4	170	1	140	88	13.1
	2	250	1	120	110	24.1

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (140 - 80) / (140 - 68) =

0.83

Building 210

Pipe	Length	Effective	DHW	Heat Loss	Total Loss
Dia	LF	insul IN	Temp	BTUH/10	Mil BTU/Y
2	10	1	140	175	1.5
1-1/2	66	1	140	138	8.0
1-1/4	45	1	140	115	4.5
1	69	1	140	100	6.0
3/4	204	1	140	88	15.7
1/2	195	1	120	87	14.9
1/2	273	1	120	50	12.0

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (140 - 80) / (140 - 68) =

0.83

Building 238

Pipe	Length	Effective	DHW	Heat Loss	Total Loss
Dia	LF	insul IN	Temp	BTUH/10	Mil BTU/Y
1-1/2	30	1º HTHW	160	185	4.9
1-1/4	40	1º HTHW	160	150	5.3
1	34	1º HTHW	160	122	3.6
3/4	57	1º HTHW	160	110	5.5
1	20	1º HTW	122	74	1.3
3/4	174	1" HTW	122	76	11.6
3/4	70	1º HWR	102	35	2.1
1/2	54	1" HWR	102	30	1.4

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Load Mil BTU/Yr

Factor: (160 - 80) / (160 - 68) = 0.87 Factor: (122 - 80) / (122 - 68) = 0.78 Factor: (102 - 80) / (102 - 68) = 0.65

Note: Building 238 DHW pipe insulation repairs are needed for 10 LF of 1-inch supply piping.

Additional heat losses from these pipes are:

Supply @ 122 Deg F, 1-inch Pipe

Total Heat Losses

800 BTUH/10LF Bare

74 BTUH/10LF 1-inch in

7.01 Mil BTU/Yr Added Lo

Building 290

Pipe Dia	Length LF	Effective Insul IN		Heat Loss BTUH/10	Mil BTU/Y
3/4	60	1	135	84	4.4
3/4	60	1	115	62	3.2

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Factor: (135 - 80) / (135 - 68) =

0.82

Note: Building 290 DHW pipe insulation repairs are needed for 15 LF of 3/4-inch supply piping.

Additional heat losses from these pipes are:

Supply @ 135 Deg F, 3/4-inch Pipe

600 BTUH/10LF Bare

84 BTUH/10LF 1-inch In

Total Heat Losses

7.88 Mil BTU/Yr Added Lo

Building 295

٢	Pipe	Length	Effective	DHW	Heat Loss	Total Loss
1	Dia	LF	Insul IN	Temp	BTUH/10	Mil BTU/Y
ŀ	2	270	1	128	168	39.7
1	1-1/2	300	1	128	116	30.5
ı	1-1/4	330	1	128	97	28.0
1	1	45	1	128	88	3.5
-	3/4	320	1	108	48	13.5

Pipes in chases and above ceiling; assume temperature is 80 Degrees F. Adjust above values by factor based on 68 Degrees F ambient temperature for above values:

Load Mil BTU/Yr

Factor: (128 - 80) / (128 - 68) =

0.80

Factor: (108 - 80) / (108 - 68) =

0.70

Note: Building 295 DHW pipe insulation repairs are needed for 10 LF of 2-inch supply piping.

Additional heat losses from these pipes are:

Supply @ 128 Deg F, 2-inch Pipe

915 BTUH/10LF Bare

165 BTUH/10LF 1-inch In 8.02 Mil BTU/Yr Added Lo

Total Heat Losses

Building 642

	Pipe Dia	Length LF	Effective Insul IN	DHW Temp	Heat Loss BTUH/10	Total Loss Mil BTU/Y
1	1-1/2	94	1	130	120	9.9
ı	1-1/2	94	1	110	70	5.8

PROCESS ELECTRIC ENERGY USE SUMMARY

Usage Code 2: Shops & Warehouses

Shops typically have one small office of about 300 to 500 SF area. It is assumed that each is fitted with a 300 SF office. Energy use from the office is, thus:

272 kW-Hr/Yr for offices

Typical (10,000 SF) shop-type equipment consumes about 4,000 kW-Hr/Yr.

Process energy use for shops is, thus

0.43 kW-Hr/SF-Yr

Warehouses do not consume significant process energy, but are equipped with small offices similar to shops. Process energy use in warehouses is, thus:

Process energy use for warehouses i

0.03 kW-Hr/SF-Yr

Usage Code 3: Barracks & Quarters without Dining

A typical 50-PN barracks without dining consumes about 20,000 kW-Hr/Yr of process energy. Loads satisfied include vending machines, watr coolers, stereos, refrigerators, washing machines and dryers, televisions and various small appliances.

Annual process energy

400 kW-Hr/PN-Yr

Usage Code 4: Barracks & Quarters with Dining

Energy use is the same as for Usage Code 3, except that cooking process energy must be added. See Usage Code 7 Dining Facilities, for the cooking energy component of process energy usage.

Usage Code 5: Recreation Facilities & Gyms without Bathing

Typically, these facilities are equipped with a small office, and minimal other process type electrical equipment. (No saunas are in operation at Fort Hunter-Liggett.)

Annual process energy

0.91 kW-Hr/SF-Yr

Usage Code 5.1: Recreation Facilities & Gyms with Bathing

Process energy use is the same as for Usage Code 5. Domestic hot water (DHW) bathing-energy use is addressed in baseline DHW use calculations.

Usage Code 6: Theaters & Community Facilities

The single theater at Fort Hunter Liggett operates 3 days per week for a period of about 6 hours. Projector equipment load is estimated at 1 kW. A small office of about 300 SF will consume energy proportional (3 Days to % Days) to a small office as described above.

Annual process energy

1,058 kW-Hr/Yr, including projection equipment

Annual process energy

244 kW-Hr/Yr

(two x 300 SF Office equivalent)

PROCESS ELECTRIC ENERGY USE SUMMARY

Usage Code 7: Dining Facilities

Consolidated Dining Facilities (mess halls): Value is based on results of metering several large Dining Facilities of a similar size. The value shown below includes all process energy consumption, including cooking.

Annual process energy

0.90 kW-Hr/Meal, all electric cooking

Usage Code 8: Base Exchanges & Stores

Base exchanges and retail type stores consume electric power for administrative office areas, at check-out stands, for water coolers, vending machines and for product refrigeration. Some facilities also have snack bars.

Annual process energy

1.70 kW-Hr/SF-Yr

Annual Cooking proce

1.50 kW-Hr/Meal, all electric cooking

Usage Code 8.1: Commissaries:

Commissaries consume electric power for administrative office areas, at check-out stands, for water coolers, vending machines and for product refrigeration. Some facilities also have snack bars.

Annual process energy

3.50 kW-Hr/SF-Yr

Annual Cooking proce

1.50 kW-Hr/Meal, all electric cooking

Usage Code 9: Clubs, Officers & NCO, etc.

Cooking Energy Use: Value is based on results of metering several clubs and snack bars of a similar size and configuration. The value shown below includes all process energy consumption, including cooking.

Cooking process ener

1.50 kW-Hr/Meal, all electric cooking

Non-cooking Energy Use: Clubs contain small offices, vending machines, coolers and video games. Values are based on take-offs from several officers and NCO clubs similar to those at Fort Hunter Liggett.

Non-cooking process

2.00 kW-Hr/SF-Yr

Usage Code 10: Family Housing

Process energy use for family housing units is based on metering numerous units and take-offs of equipment and furnishings. The annual value provided includes cooking energy consumption for propane burning stoves and ovens in kitchens.

Family Housing Unit pr

5,900 kW-Hr/Yr Electric Power

10.5 Mil BTU/Yr Propane Use

Usage Code 11: Schools

There are no schools identified in this EEAP.

PROCESS ELECTRIC ENERGY USE SUMMARY

Usage Code 11.3: Child Development Centers

Process energy consumption for Child Development Centers includes administrative office equipment, including copying machines, cooking snacks and meals for the children. For the purposes of estimating process energy use, one 300 SF size office is assumed, including copy machine. Meals are prepared using an all-electric kitchen at about the same efficiency as recorded for Usage Code 9 above.

Non-cooking process

272 kW-Hr/Yr

Cooking process ener

0.90 kW-Hr/Meal, all electric cooking

Usage Code 12: Clinics (w/o Beds)

There are no Clinics without beds in this EEAP.

Usage Code 12.1: Hospitals & Clinics with Beds

Non-cooking process

3.40 kW-Hr/SF-Yr

Cooking process ener

0.90 kW-Hr/Meal, all electric cooking

Special, Significant Process Loads

Building 80 Post Exchange:

Refrigeration Equipment:

24.2 kW approx connected load

4,000 approx full Load Hours

96,626 kWH/Yr

Building 121 Bowling Center:

Pin Setting Equipment load is about:

2.6 kWH/Yr-SF

Energy use based on detailed studies of similar Army facilities.

Building 182 Commissary:

Refrigeration Equipment:

40.6 kW approx connected load

4,000 approx full Load Hours

162,282 kWH/Yr

Building 238 TEXCOM HQ Building / Photo Lab:

46.2 kW Panel Load Fata

0.57 Diversity Factor @ Panel Rating

0.30 Usage Diversity Assumed

2,080 Hours per Year

16,425 kWH/Yr

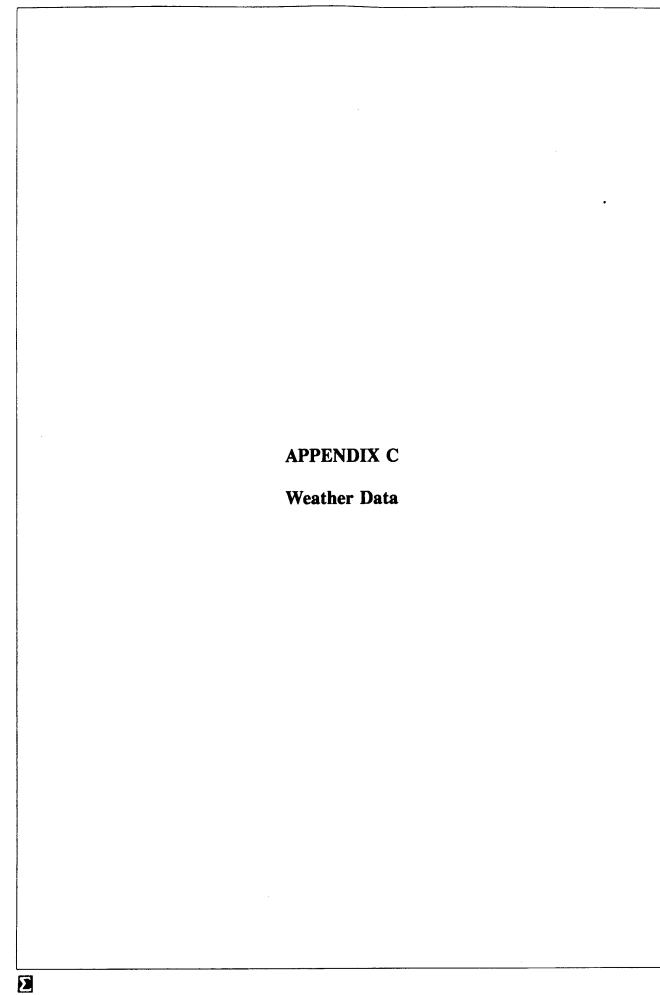
Building 301 ADP Building:

188.5 kW Connected Load @ Equipment List

0.30 Usage Diversity Assumed

8,760 Hours per Year

495,272 kWH/Yr



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APPENDIX C

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APPENDIX C

WEATHER DATA

Weather data is required for building heating, ventilating and air conditioning (HVAC) analyses and designs. The Army's Engineering Weather Data Technical Manual (TM 5-785) lists heating and cooling system design data for Fort Hunter-Liggett, California (FHL). Design data extracted from this TM appears as Table C-1.

C.1 Development of Hourly Temperature Data for Fort Hunter-Liggett.

Bin type temperature data, provided in TM 5-785 for many locations, is not available for FHL. This type of data is required to accurately model building HVAC system energy consumption for existing conditions and for energy savings modifications to be evaluated.

Available meteorological data is evaluated and adjusted to synthesize a useable data base for FHL. Data sources used in this development include:

- (1) TM 5-785 U.S. Army Engineering Weather Data Technical Manual: Design heating and cooling data and annual Heating Degree-Days (H-DD/Yr) for FHL and for Camp Roberts (near Paso Robles) are used. Refer to Table C-1.
- (2) Trane Corporation weather data for Paso Robles California: Temperature data is available for use with the Trane Trace HVAC computer simulation program. This data is provided in the form of hourly dry and wet bulb temperatures for a typical day of each month. Paso Robles data, the closest location for which reliable hourly weather data is available, is used as the basis for the synthesis of a day's hourly data for FHL.
- (3) Historical average daily minimum and maximum temperatures for FHL: This data is provided by the TECOM Atmospheric Sciences Division, Hunter-Liggett Meteorological Team. This data is based on almost 30 years of records beginning in 1964 and continuing through the present.

The purpose of this project is to reduce energy use. Accurate calculation of energy use by building HVAC systems requires site-specific meteorological data. Adjustments are made to Paso Robles hourly temperature data to synthesize a record for FHL. Temperatures are adjusted until calculated H-DD/Yr based on average daily temperatures match the H-DD/Yr listed in TM 5-785 for FHL. The procedure used for this synthesis is summarized below:

(1) Calculated 65 degree F based H-DD/Yr using hourly temperature data for Paso Robles: 3,540 H-DD/Yr @ hourly temperatures, 1 day per month.

EEAP, Limited Energy Study Fort Hunter-Liggett, California

- (2) Calculated 65 degree F based H-DD/Yr using average daily temperatures for Paso Robles: 2,898 H-DD/Yr @ average daily temperatures, 1 day per month.
- (3) Compared calculated H-DD/Yr for Paso Robles results to H-DD's listed in TM 5-785 for Camp Roberts (very close to Paso Robles) and found that H-DD's calculated from average daily temperatures match those listed in TM 5-785 for Camp Roberts: Camp Roberts has 2,890 H-DD/Yr @ TM 5-785.
- (4) Adjusted Paso Robles hourly temperatures at and below 65 degrees until H-DD/Yr calculated based on average daily temperatures matches the H-DD's listed in TM 5-785 for FHL:

FHL 3,332 H-DD/Yr @ TM 5-785

FHL 3,289 H-DD/Yr @ average daily temperatures (-1.3% of TM value)

FHL 4,026 H-DD/Yr @ hourly temperatures, 1 day per month.

- (5) Compared data sources available to synthesized hourly temperatures for each month by plotting results. Refer to Figures C-1 through C-8.
- (6) Adjusted Paso Robles wet bulb temperatures for the synthesized FHL data to match the profile shown for Paso Robles. Results are plotted on Figures C-2 through C-8.

The comparison of synthesized weather data to records at FHL and Paso Robles shown on Figure C-1 indicates that synthesized temperature data are reasonable.

Note that cooling season temperatures (above about 70 degrees F) are not adjusted from the Paso Robles data. No measure of cooling degree days (or hours) is available for FHL from TM 5-785 upon which to base an adjustment calculation. Based on inspection of summer (cooling) season design and criteria temperatures shown on Table C-1, cooling requirements are about equivalent for Camp Roberts and FHL.

C.2 Daily Degree-Hour Schedules.

Hourly schedules are developed for use in analyses of energy savings calculations for both heating and cooling seasons. Hourly schedules will allow energy use calculations to be tailored to an individual buildings specific operating schedule.

The schedules are shown on Tables C-2 through C-5 for heating and for cooling degree-hours. Calculations use degree-hours rather than degree-days.

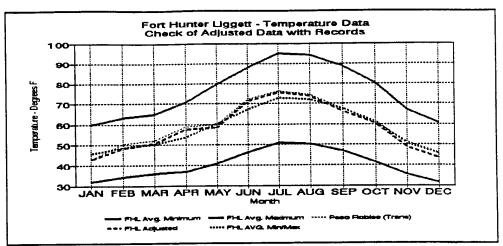


Figure C-1. Check of Synthesized Weather Data Against Records.

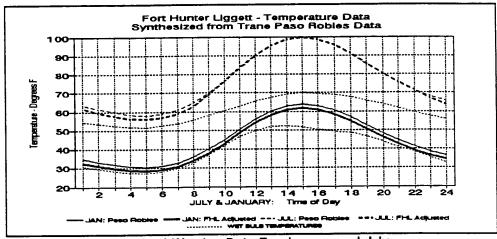


Figure C-2. Synthesized Weather Data For January and July.

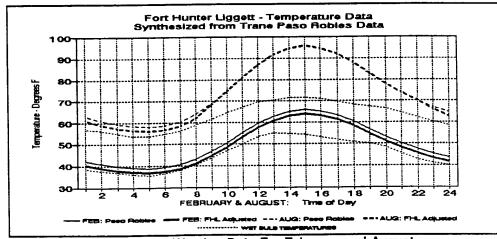


Figure C-3. Synthesized Weather Data For February and August.

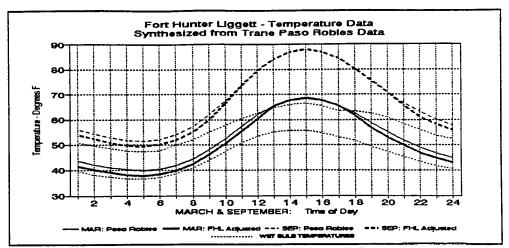


Figure C-4. Synthesized Weather Data For March and September.

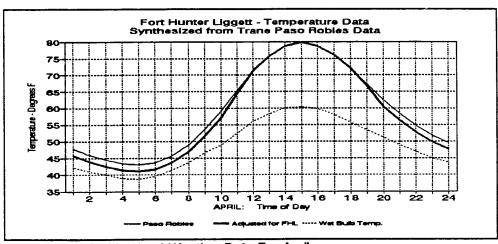


Figure C-5. Synthesized Weather Data For April.

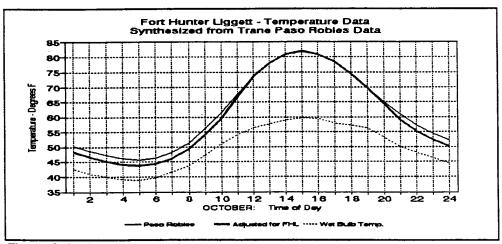


Figure C-6. Synthesized Weather Data For October.

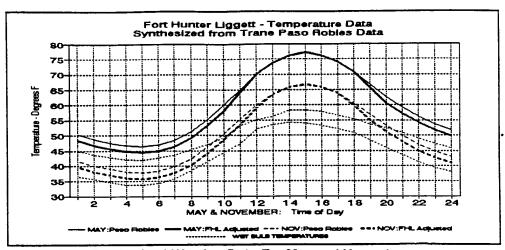


Figure C-7. Synthesized Weather Data For May and November.

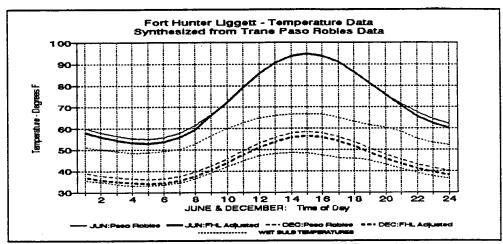


Figure C-8. Synthesized Weather Data For June and December.

Table C-1. Design Weather Data from TM 5-785.

			<u></u>	# # # # #	EATES	DATA	DEGREE				N N N N N N N N N N N N N N N N N N N	CONDIDENT	A SE					SUMMER AIR C	COMBITTONI	1 2 <u>2</u>	1
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Centerville Beach Chico MAP China Lake NAF/Armitage Fld Chula Vista Compton	333 332 332 332 332 336 336 336 336 336	124 21 121 51 117 41 117 05	280 238 2283 25 65	340238 380238	88844 80840	MES-E	5 5029 5 2835 5 2560 6 1839 4 1606	103 107 91	69 10 69 70 69 69 69 69 69 69 69 69 69 69 69 69 69	65 65 65 65 65 65 65 65 65 65 65 65 65 6	99333	SSSE	225 84 84 84 84	86 86 88 88	222	0000 0000 0000 0000 0000	26 806	1410 2116 34 486	2002	385 301 426 438	
Concord NAD Corona Coronado Costa Mesa ANG Station Crows Landing	332 40 332 40 37 240 250	122 00 117 28 117 10 117 53	550 10 149 149	234088 334088	2000 E	Seme?	3035 3035 6 1839 4 2767	102 78 102 102	90090	980	440000 440000	Sarss	98789 48429	788888 88888	1211 1211 1211	90000	8 188 1 214 9 20 0 320	921 1134 34 288 1294	608 2233 233	318 648 475 505	
Cuddeback Dry Lake Range	35 18	117 28	2300	50	22 W	Z.	3 3203	104	67 10	02 6	7 35	HSH.	66	99	2	69 67	504	1505	9	216	
Daggett use Barstow-Daggett Dixon Donner Summit Edwards AFB	38 26 39 19 34 54	121 51 120 20 117 52	100 7195 2302	30	233 233	NNE 16	6 2826 8 8290 3 3077	104	69 67 10	96 75 02 6	8 36 7 35	ASA ASA ASA	933	67 53 66	71 58 70	69 69 69 69	8 165 5 0 7 504	815 13 1505	509	327 3 216	
E1 Centro NAF E1 Toro MCAS/Santa Ana Fallorook Annex Fort Baker	32 33 37 37 50 4 49 49	115 40 117 44 117 15 122 28 122 32	-43 383 703 15	888888 888888	4434 400 400 400	3MM33	6 925 4 1573 5 2077 5 3080 5 3080	112 92 74 74	460 63 63 63 63	10 7 88 7 94 7 71 6	2004 2002 2009 2009 2009	W.	108 91 69 69	54 69 61 61	#EE 49	711 70 711 70 711 70 62 61 62 61	8 1413 0 38 0 112 1 0	3067 502 846 12 12	904 317 00 0	1832 609 609 8	
Fort Irwin Fort MacArthur Fort Mason Fort Ord/Fritzsche AAF Fresno/Air Terminal	35 33 37 48 36 48 46 46	116 41 118 18 122 26 121 46 119 43	2500 200 50 134 328	2466 208 208 208	644 600 800 ₹	Smann	7 2547 4 1819 5 3080 5 3818 5 2650	106 74 74 102	688 10 63 8 61 10	00170 0000 0000 0000	90298	S S S S S S S S S S S S S S S S S S S	102 78 69 67 97	67 61 68 68	£0432	71 70 59 68 52 61 51 59	809 3374	2133 109 12 23 1399	32 000 27	291 291 8 224	
George AFB/Victorville Hamilton AFB/San Rafael Hayvard Hunter Liggett Mil Rsvn	34 35 38 04 37 39 36 01	117 23 122 30 122 07 121 14	2875 3 47 1090	24303	28 28 28 28	OZWZ	5 2885 4 3311 5 2909 2 3332	102 89 102	668 688 717	9346 9346	2000 2000 1000 1000	SEN EN	9200	62 67 67	9629	68 67 69 61 72 70	7 433 7 10 3 10 0 358	1495 184 230 1153	22 20 53	150 171 14 440	

Table C-2. Hourly Heating Degree-Hour Data for Fort Hunter Liggett, California. (based on 65 degrees F)

834 679 502	5/1 456 328 204 583 450 298 146	234 18		0 0 0	0 0 0	0 0 (0 0	0 0	348 180	431	1,296	2400 Total	949 16,346			522 7,584									41 96,632
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20,1 45,1	808 406	675	909	318	526	236	426	617	8 43	933	7,543	1500	96	58	0	0	0	0	0	0	0	0	0	270	394
1,051	4 4 5 7 7 7	633	292	270	174	189	381	574	810	806	7,062	1400	127	20	0	0	0	0	0	0	0	0	0	291	469
L00,L	694 725	929	518	210	109	130	327	518	765	871	6,444	1300	211	112	0	0	0	0	0	0	0	0	45	347	715
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725 772 806 834 843 825 576 633 675 708 720 699 518 567 605 632 642 623 210 270 318 354 366 342 109 174 226 267 279 254 130 189 236 270 282 260 327 381 426 459 471 447 518 574 617 651 663 642 765 810 843 870 879 861 871 908 933 955 961 949 6,444 7,062 7,543 7,912 8,036 7,793 7 7 740 180 1700 1800 1800 1800	694 734 764 787 795 778 694 734 764 787 795 778 725 772 806 834 825 778 576 633 675 708 720 699 518 567 605 632 642 623 210 270 318 354 366 342 109 174 226 267 279 254 130 189 236 270 282 260 327 381 426 459 471 447 518 574 617 651 663 642 765 810 843 870 879 861 871 908 933 955 961 949 6,444 7,062 7,543 7,912 8,036 7,793 7,793 211 127 96 1700 1800 1700 313	694 734 764 787 795 778 694 734 764 787 795 778 725 772 806 834 843 825 576 633 675 708 720 699 518 567 605 632 642 623 210 270 318 354 366 342 109 174 226 267 279 254 130 189 236 270 282 260 327 381 426 459 471 447 518 574 617 651 663 642 765 810 843 870 879 861 871 908 933 955 961 949 6,444 7,062 7,543 7,912 8,036 7,793 7 211 127 96 127 202 313 211 50 28 50 104 188 <td>694 734 764 787 795 778 694 734 764 787 795 778 725 772 806 834 843 825 576 633 675 708 720 699 518 567 605 632 642 623 210 270 318 354 366 342 109 174 226 267 279 254 130 189 236 270 282 260 327 381 426 459 471 447 518 574 617 651 663 642 765 810 843 870 879 861 871 908 933 955 961 949 6,444 7,062 7,543 7,912 8,036 7,793 7 8 112 96 127 202 313 112 50 28 50 104 105 <</td> <td>694 734 764 787 795 778 694 772 806 834 843 825 725 772 806 834 843 825 576 633 675 708 720 699 518 567 605 632 642 623 210 270 318 354 366 342 109 174 226 267 279 254 130 189 236 270 282 260 327 381 426 459 471 447 518 574 617 651 663 642 765 810 843 870 879 861 871 908 933 955 961 949 6,444 7,062 7,543 7,912 8,036 7,793 7 7 112 96 127 202 313 112 50 28 50 104 188 <</td> <td>725 772 806 834 843 825 725 772 806 834 843 825 576 633 675 708 720 699 518 567 605 632 642 623 210 270 318 354 366 342 109 174 226 267 279 254 130 189 236 270 282 260 327 381 426 459 471 447 518 574 617 651 663 642 765 810 843 870 879 861 871 908 933 955 961 949 6,444 7,062 7,543 7,912 8,036 7,793 7 8 1300 1400 1500 1700 180 90 105 9 10 10 0 0 0 0 0 0 112 50 28</td> <td>694 734 764 787 778 778 725 772 806 834 843 825 576 633 675 708 720 699 518 567 605 632 642 623 210 270 318 354 366 342 109 174 226 267 279 254 130 189 236 270 282 260 327 381 426 459 471 447 518 574 617 651 663 642 765 810 843 870 879 861 871 908 933 955 961 949 6,444 7,062 7,543 7,912 8,036 7,793 7 112 50 120 1700 180 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>725 734 764 787 778 778 725 772 806 834 843 825 576 633 675 708 720 699 518 567 605 632 642 623 210 270 318 354 366 342 109 174 226 267 279 254 130 189 236 270 282 260 327 381 426 459 471 447 518 574 617 651 663 642 765 810 843 870 879 861 871 908 933 955 961 949 871 127 202 313 112 50 28 50 104 188 112 50 28 50 104 188 0 0 0 0 0 0 0 112 50 28 50<!--</td--><td>year 734 764 787 795 778 725 772 806 834 843 825 576 633 675 708 720 699 518 567 605 632 642 623 210 270 318 354 366 342 109 174 226 267 279 254 130 189 236 270 282 260 327 381 426 459 471 447 518 574 617 651 663 642 765 810 843 870 879 861 871 908 933 955 961 949 874 7,062 7,543 7,912 8,036 7,793 7 8 112 50 28 50 104 105 9 0 0 0 0 <</td><td>y y</td><td>y y</td><td>year 1,504 1,504 1,150 1,110</td><td>y 1,021 1,123 1,1</td></td>	694 734 764 787 795 778 694 734 764 787 795 778 725 772 806 834 843 825 576 633 675 708 720 699 518 567 605 632 642 623 210 270 318 354 366 342 109 174 226 267 279 254 130 189 236 270 282 260 327 381 426 459 471 447 518 574 617 651 663 642 765 810 843 870 879 861 871 908 933 955 961 949 6,444 7,062 7,543 7,912 8,036 7,793 7 8 112 96 127 202 313 112 50 28 50 104 105 <	694 734 764 787 795 778 694 772 806 834 843 825 725 772 806 834 843 825 576 633 675 708 720 699 518 567 605 632 642 623 210 270 318 354 366 342 109 174 226 267 279 254 130 189 236 270 282 260 327 381 426 459 471 447 518 574 617 651 663 642 765 810 843 870 879 861 871 908 933 955 961 949 6,444 7,062 7,543 7,912 8,036 7,793 7 7 112 96 127 202 313 112 50 28 50 104 188 <	725 772 806 834 843 825 725 772 806 834 843 825 576 633 675 708 720 699 518 567 605 632 642 623 210 270 318 354 366 342 109 174 226 267 279 254 130 189 236 270 282 260 327 381 426 459 471 447 518 574 617 651 663 642 765 810 843 870 879 861 871 908 933 955 961 949 6,444 7,062 7,543 7,912 8,036 7,793 7 8 1300 1400 1500 1700 180 90 105 9 10 10 0 0 0 0 0 0 112 50 28	694 734 764 787 778 778 725 772 806 834 843 825 576 633 675 708 720 699 518 567 605 632 642 623 210 270 318 354 366 342 109 174 226 267 279 254 130 189 236 270 282 260 327 381 426 459 471 447 518 574 617 651 663 642 765 810 843 870 879 861 871 908 933 955 961 949 6,444 7,062 7,543 7,912 8,036 7,793 7 112 50 120 1700 180 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	725 734 764 787 778 778 725 772 806 834 843 825 576 633 675 708 720 699 518 567 605 632 642 623 210 270 318 354 366 342 109 174 226 267 279 254 130 189 236 270 282 260 327 381 426 459 471 447 518 574 617 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Table C-3. Hourly Cooling Degree-Hour Data for Fort Hunter Liggett, California. (based on 65 degrees F)

•)))			•						
Time of Day	0100	0200	0300	0400	0200	0090	0020	0800	0060	1000	1100	1200
January	0	0	0	0	0	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0	0	0	0	0	189
May	0	0	0	0	0	0	0	0	0	0	0	158
June	0	0	0	0	0	0	0	0	27	222	426	618
July	0	0	0	0	0	0	0	0	130	357	277	784
August	0	0	0	0	0	0	0	0	105	298	499	685
September	0	0	0	0	0	0	0	0	0	45	261	438
October	0	0	0	0	0	0	0	0	0	0	26	267
November	0	0	0	0	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	263	921	1,818	3,139

Time of Day	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	Total
January	0	0	0	0	0	0	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0	0	0	0	0	0
March	16	87	112	87	22	0	0	0	0	0	0	0	322
April	321	411	444	411	333	213	\$	0	0	0	0	0	2,376
May	273	347	378	347	282	177	55	0	0	0	0	0	1,984
June	765	861	897	861	777	642	486	330	168	18	0	0	7,098
July	942	1,045	1,085	1,045	955	812	642	474	329	198	65	0	9,440
August	828	921	958	921	840	710	558	403	273	155	31	0	8,184
September	570	657	069	657	582	459	318	174	21	0	0	0	4,872
October	403	493	527	493	415	291	143	0	0	0	0	0	3,088
November	0	54	51	24	0	0	0	0	0	0	0	0	66
December	0	.	0	0	0	0	0	0	0	0	0	0	0
TOTAL	4,117	4,845	5,142	4,845	4,206	3,304	2,222	1,381	790	371	96 .	0	37,463

Table C-4. Hourly Heating Degree-Hour Data for Fort Hunter Liggett, California. (based on 70 degrees F)

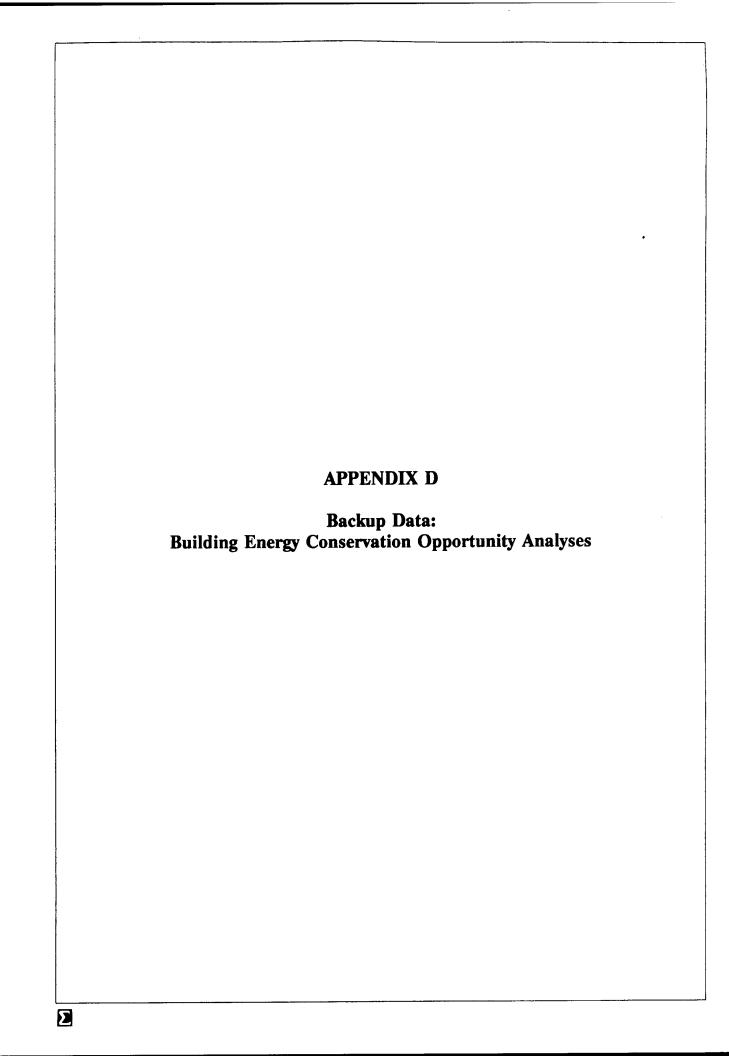
Time of Day	0100	0200	0300	0400	0200	0090	0200	0800	0060	1000	1100	1200
January	1,156	1,206	1,249	1,280	1,290	1,268	1,218	1,122	686	834	657	490
February	834	874	904	927	935	918	882	812	711	296	468	344
March	880	927	961	686	866	980	936	856	738	605	453	301
April	726	783	825	828	870	849	792	693	549	384	168	0
May	673	722	760	787	797	778	732	645	521	375	183	0
June	360	420	468	504	516	492	432	324	123	0	0	0
Juk	264	329	381	422	434	409	8	226	52	0	0	0
August	285	344	391	425	437	415	357	248	20	0	0	0
September	477	531	929	609	621	297	543	4 4 4	300	105	0	0
October	673	729	772	806	818	797	741	639	490	322	66	0
November	915	096	993	1,020	1,029	1,011	696	891	777	645	498	330
December	1,026	1,063	1,088	1,110	1,116	40,	1,070	1,008	918	812	694	286
TOTAL	8,269	8,887	9,368	9,737	9,861	9,618	9,015	7,907	6,189	4,679	3,220	2,051

Time of Day	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	Tota/
January	366	282	251	282	357	468	605	741	853	958	1,042	±,	20,066
February	252	190	168	190	244	328	428	529	613	689	750	798	14,386
March	140	89	£4	89	133	260	409	524	623	713	784	837	14,226
April	0	0	0	0	0	0	96	282	408	516	909	672	10,080
Mav	0	0	0	0	0	0	133	291	397	490	292	626	9,477
June	0	0	0	0	0	0	0	0	0	132	228	300	4,299
Juk	0	0	0	0	0	0	0	0	0	0	06	198	3,122
August	0	0	0	0	0	0	0	0	0	0	124	226	3,302
September	0	0	0	0	0	0	0	0	129	267	357	423	5,979
October	0	0	0	0	0	0	57	174	34 44	459	549	617	9,040
November	195	126	66	126	186	312	456	292	663	750	819	873	15,210
December	502	446	425	446	496	570	099	750	828	968	952	992	19,558
TOTAL	1,455	1,113	986	1,113	1,415	1,939	2,800	3,861	4,857	5,869	898'9	999'2	128,744

Table C-5. Hourly Cooling Degree-Hour Data for Fort Hunter Liggett, California. (based on 70 degrees F)

Time of Day	0100	0200	0300	0400	0200	0090	0020	0800	0060	1000	1100	1200
January	0	0	0	0	0	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0	0	0	0	0	0
April	0	0	0	0	0	0	0	0	0	0	0	39
Мау	0	0	0	0	0	0	0	0	0	0	0	က
June	0	0	0	0	0	0	0	0	0	72	276	468
July	0	0	0	0	0	0	0	0	0	202	422	629
August	0	0	0	0	0	0	0	0	0	143	84	530
September	0	0	0	0	0	0	0	0	0	0	111	288
October	0	0	0	0	0	0	0	0	0	0	0	112
November	0	0	0	0	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	0	0	0	0	0	0	0	0	0	416	1,153	2,069

Time of Day	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	Total
January	0	0	0	0	0	0	0	0	0	0	0	0	0
February	0	0	0	0	0	0	0	0	0	0	0	0	0
March	0	0	0	0	0	0	0	0	0	0	0	0	0
April	171	261	294	261	183	æ	0	0	0	0	0	0	1,272
Мау	118	192	223	192	127	ឧ	0	0	0	0	0	0	877
June	615	711	747	711	627	492	336	180	18	0	0	0	5,253
July	787	890	930	890	800	657	487	319	174	43	0	0	7,229
August	673	992	803	992	685	555	403	248	118	0	0	0	6,033
September	420	202	540	202	432	309	168	24	0	0	0	0	3,306
October	248	338	372	338	260	136	0	0	0	0	0	0	1,804
November	0	0	0	0	0	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	3,032	3,665	3,909	3,665	3,114	2,234	1,394	771	309	£	0	0	25,774



EEAP, Limited Energy Study Fort Hunter Liggett, California

APPENDIX D

Table of Contents

ECO

No. ECO Description

Architectural

A 1	Caulk and Weatherstrip
A2	Install Double Glazing
A3	Insulate Exterior Walls
A4	Insulate Ceilings/Roofs
A5	Install Solar Film
A6	Reduce Glass Area
A7	Install Shading Devises

HVAC

B1	Install Load Shedding System (Local Controllers)		
B2	Shade Condensers From Direct Sunlight		
B3	Insulate Ductwork		
B4	Insulate Piping and Fittings		
B5	Install Outside Air Temperature Reset		
B6/B7	Install Time Clocks and Provide Night Set Back/Setup		
B8	Replace Inefficient Chillers		
B9	Install Heat Recovery System		
B10	Install Automatic Draft Damper Controls on Space Heating Equipment		
B11	Install Economizer Cycle		
B12	Install Boiler Oxygen Trim Controls and Revise Controls		
B13	Install Evaporative Precoolers		
B14	Install Multizone Controls		
B15	Retrofit to Variable Air Volume		
B16	Automate Summer/Winter Switchover (See B6/B7)		
B17	Relocate Transformer		
B18	Add Zone Optimizer to Reheat Systems		
B19	Add Deadband Controls (See B6/B7)		
B20	Consolidate Food Storage		
B21	Replace Inefficient Boiler or Burner		

EEAP, Limited Energy Study Fort Hunter-Liggett, California

ECO

No. ECO Description

DOMESTIC HOT WATER

- C1 Reduce Hot Water Temperatures
- C2 Insulate Hot Water Pipes
- C3 Insulate Hot Water Storage Tanks
- C4 Install Electrical Ignitors in Gas Hot Water Heaters
- C5 Install Aerators/Flow Restrictors in Lavatories and Showers
- C6 Use Cold Water for Laundering
- C7 Replace Electric Booster for Garbage Can Washer
- C8 Recover Heat From Dishwasher Hot Water
- C9 Install Automatic Draft Damper Controls on DHW Heaters

LIGHTING AND ELECTRICAL

- D3 Retrofit Exterior Lighting With HPS Fixtures
- D4 Replace Incandescent Lighting With Fluorescent
- D5 Install Electronic Ballasts and T8 Lamps
- D8 Improve Power Factor
- D9 Replace Motors With High Efficiency Units
- D10 Install FM Radio EMCS

COMPUTATION SHEET

Keller & Gannon

Engineers-Architects

COMPUTED BY B/H CHECKED BY	ECO AL	PROJECT 16.403-10
DATE MAR 1993	CAULK & WEATHER STRIP	
REV19	DOORS & WINDOWS	SHEET NO OF SHEETS

DESCRIPTION OF ACTION

Infiltration of outdoor air through gaps and cracks around openings in exterior walls increases HVAC energy use. Infiltrating outside air must be conditioned to inside temperature.

Infiltration is reduced with properly sealed openings, thus, HVAC energy use is reduced.

Facilities Included for Evaluation

Buildings included are listed in tabular calculations which follow.

Energy Savings Calculations

Infiltration through Window & Door Cracks:

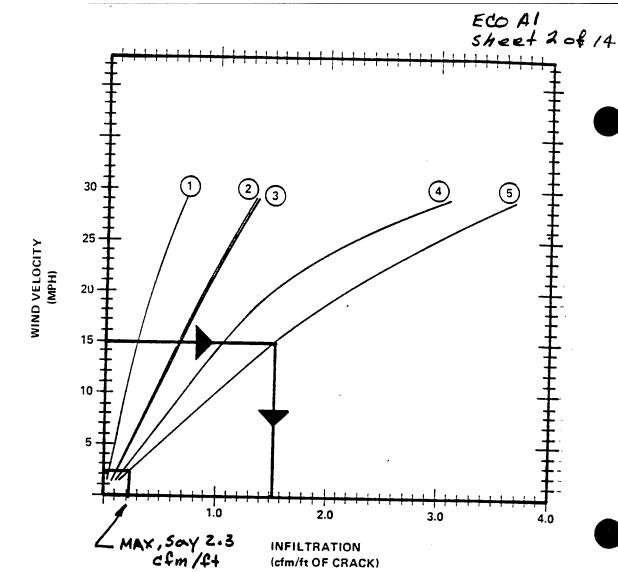
The affected nomograph is used to determine the infiltration vate based on the design condition wind speed @ TMS-785.

worst case In littration rate 2.3 CFM/LF CRACK
Block load: Hesting:

2.3 cm = 1.08 = (72-24)/1000 = 0.12 kBTUH
WORT dese keating of = 56%

fuel savings (Propere most exponsive)

0.12/0.56 = 0.22 kBTUH
Continuous day-hr/yr @720=/42,323



KEY	:		WEATHER	
NO.	TYPE	MATERIAL	STRIPPED	FIT
1.	ALL	WOOD	YES	AVERAGE
	HINGED	METAL	YES	AVERAGE
2.	ALL	WOOD	NO	AVERAGE
	HINGED	METAL	NO	AVERAGE
	DOUBLE HUNG	STEEL	NO	AVERAGE
3.	ALL	WOOD	YES	LOOSE
	DOUBLE HUNG	STEEL	YES	AVERAGE
4.	CASEMENT/STEEL	STEEL	NO	AVERAGE
5.	ALL	WOOD	NO	LOOSE
	DOUBLE HUNG	STEEL	NO	AVERAGE

(cfm/ft OF CRACK)

@TM5-785, FORT HUNTER- LIGGETT MEAN WIND SPEED = 2 Knots = 2,2 MPH.

COMPUTED BY BIA	ECO AI	PROJECT 16-403-10
DATE MARCH 193	CAULK & WEATHEDSTRIP	
	DOORS & WINDOWS	SHEET NO. 6 OF 14- SHEE

weatherstripping heating savings:

 $\frac{0.22 \times /42,323}{(72-24)} = 0.63/\times 10^6 870 \text{Mg}$

fuel cost saved: \$ 7.87 x 0.631 = \$ 4.97/4r.- LF

weatherstrupping cooling energy savings:

(for All bldys only - Evap cooled buildings will have no additional energy savings bluring cooling saason.)

Assume COP = 2.6 for "normel case" at FHL.

Heat Gain: 2.3 CEH 21.08 = (102 - 72)/1000

= 0.074 KBTUH

Cooling Energy use saved:

0.074 × 103 BTU : 3413 BTU/KWH = 8 WH/41-L 3.6 H. : 3413 BTU/KWH = 8 WH/41-L

This would require about 1200 LF of crack per bldy to achieve \$11/41 Soun

-> neglect cooling energy sevings for this ECO as Non-significants

EVALUATE WEATHERSTRIPPING ONLY
FOR HEATTING FUEL SAURGS

COMPUTATION SHEET

Keller & Gannon

Engineers-Architects

COMPUTED BY RIH

CHECKED BY

DATE MAR 1997

REV. JUNE 1993

DOORS & WINDOWS

PROJECT 16.403.10

FHL EEAP

SHEET NO. 4 OF 14 SHEETS

CAULKING ENERGY SAVINGS

Caulking cracks around exterior openings will reduce infiltration as Loes weather-stripping, CFM savings are estimated at about 1/10 that of exact openings a nomograph on skeet 2 of this calc. set.

0.23 CFM /CF crack.

COST ESTIMATES

Unit prices for caulking are based on the 1993 Means Construction Cost Estimating Guide and are actually a little lower than the lowest unit cost provided by Means. In-house forces are not available to perform these tasks according to DEH at Fort Hunter Liggett.

Bldg 131 Op	enings				
Description	No. Ea	L	Н	Crack LF	Caulk LF
Window	14	28	48	233	177
Window	1	135	30	30	28
Door	2	3	7	5	3
Total				268	208
Bldg Floor S	F:	998	LF/SF	0.27	0.21
Bldg 6 Open	ings				
Description	No. Ea	L	W	Crack LF	Caulk LF
Window	6	32	48	104	80
Window	2	20	20	17	13
Window	6	25	33	75	58
Door	3	3	7	7	5
Total				202	156
Bldg Floor S	F:	1,090	LF/SF	0.20	0.16
Average, Bld	lg 6 & 131		LF/SF	0.24	0.18
These factor	s used fo	bldgs	124,149	9,79	
Bldg 81 Ope	nings				
Description	No. Ea	L	W	Crack LF	Caulk LF
Door	4	44	86	115	87
Door	1	36	86	28	20
Door	1	72	86	34	26
Total				176	133
Bldg 101 Op	-				
Description		L	W	_	Caulk LF
Door C	1	78	75	26	26
Door E	1	102	120	37	37
Door H	1	88	99	31	31

Bidg 101 Op	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
Door C	1	78	75	26	26
Door E	1	102	120	37	37
Door H	1	88	99	31	31
Window D	2	84	96	0	60
Window G	4	64	63	106	85
Total				199	238
•					
Window F	3	102	120	141	111
Window G	2	64	63	53	42
Window J	2	86	96	77	61
Total				271	214
Door K	18	36	84	360	360
Window A	16	67	84	515	403
Window L	4	84	84	112	112
Window M	8	24	48	128	96

ECO A1 INSTAL	L WEATHE	R STRIPPI	NG AN	D CAULK AF	ROUND OPENIN
Window N	12	46	36	200	164
Window O	6	48	30	93	78
Total				1,408	1,213
· Otal				1,400	1,210
Bldg 120 Op	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
Window A	5	45	30	New	63
Window B	1	95	75	New	28
Door C	13	36	79	New	249
Door D	1	36	83	New	20
Window E/F	7	66	28	New	110
Roll-up Dr G	3	150	138	N/A Not (Conditioned
Window H	4	46	54	New	67
Window I	1	64	80	New	24
Window J	4	72	35	New	71
Dbl Door K	1	36	84	New	20
Door L	1	60	84	New	24
Total				0	676
				•	
Bldg 127 Op	enings				
Description	No. Ea	L	·W	Crack LF	Caulk LF
Windows	12	66	30	222	192
Doors	2	36	84	40	40
Total				262	232
Bldg 128 Ope	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
Windows	52	60	48	New	936
Doors	26	36	84	New	520
Total				0	1,456
					
Bldg 146 Op	_				
Description	No. Ea	L	W		Caulk LF
Sliding Wind	4	66	33	77	66
Personnel D	2	36	84	40	40
Sliding Door	1	1120	96	203	203
Total				320	309
Bldg 161 thru	. 167 Ope	aninge			
Description	-	zimigs L	W	Crack LF	Caulk I E
Sliding Wind	20	48	30	310	260
Personnel D	20	46 36	84	40	40
Total		30	04	New	300
ıvlal				IACM	300

ECC Al

Sheets of 14

Bldg 186 Openings

Description	No. Ea	L	W	Crack LF	Caulk LF
Sliding Wind	10	60	48	NA	180
Personnel D	4	60	96	NA	104
Total				NA	284
Bldg 186 Ope	eninas				
Description	•	L	W	Crack LF	Caulk LF
Window 5	1	48	70	NA	20
Window 6	1	48	216	NA	44
Window 4	6	36	66	NA	102
Window 3	2	18	54	NA	24
Door 1	1	72	96	NA	28
Door 3	2	36	84	NA	40
Window 2	4	72	72	NA	96
Door 2	1	36	84	NA	20
Door 20	1	72	96	NA	28
Total				NA	402
Bldg 186 Ope	eninas				
Description	No. Ea	L	W	Crack LF	Caulk LF
Window A	2	32	60	Good Co	31
Window B	3	30	41	46	36
Door C	1	32	84	19	19
Door D	2	64	84	63	49
Window E	6	64	48	136	112
Total				264	247
Bldg 205, 20	7, 208, 22	9 & 230	Open	ings	
Description		L	-	Crack LF	Caulk LF
Sliding Wind	100	24	72	2,200	1,600
Single Door	9	3	84	131	131
Double Door	2	60	84	62	48
Total				2,393	1,779
Bldg 241 Ope	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
S Wall Door	1	72	84	33	26
W Wall Wind	1	84	36	23	20
W Wall Door	1	60	84	31	24
N Wall Door	1	36	84	20	20
N Wall Door	1	72	84	33	26
E Wall Door	1	216	180	66	66
E Wall Door	2	72	84	52	52
E Wall Door	1	36	84	20	20
Total	-	-		278	254

Bldg 252 Op	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
F Window	0	72	60	0	0
B Window	0	96	72	0	0
C Window	0	48	72	0	0
D Window	7	40	60	152	117
E Window	.0	32	72	0	0
Door - Dbl	3	60	86	95	73
Door - Singl	5	36	86	102	102
Total				348	291
Bldg 256 Op	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
F Window	0	72	60	0	0
B Window	0	96	72	0	0
C Window	0	48	72	0	0
D Window	12	40	60	260	200
E Window	1	32	72	23	17
Door - Dbi	0	60	86	0	0
Door - Singl	2	36	86	41	41
Total				324	258
Bldg 259 Op	onings				
Description	No. Ea	L	w	Crack LF	Caulk LE
F Window	110. La	72	60	432	352
B Window	2	96	72	68	552 56
C Window	2	48	72	52	40
D Window	0	40	60	0	0
E Window	0	32	72	0	0
Door - Dbl	3	60	86	95	73
Door - Singl	3 10	36	86	203	203
Total		30	- 00	850	724
Bidg 290 Ope	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
A Window	4	70	34	81	69
B Door - Sin	3	36	84	60	60
C Door - Dbi	4	72	84	132	104
D Window	1	48	30	16	13
E Window	1	48	36	New	14
Total				288	260
DI4- 004 0					
Bldg 291 Ope	_		14/	Onnalet	Ontalle Let
Description	No. Ea	L	W	Crack LF	Caulk LF

ECO A1 INSTALL WEATHER STR	IPPING AND CAULK AROUND OPENINGS
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ECO Al Skeet 8 of 14

A Window	1	60	48	22	18
B Door - Dbl	1	72	84	33	, 26
C Door - Sin	1	36	84	20	20
D Roll-up Do	2	144	144	96	96
Total				171	160
Bldg 295 Ope	enings				
Description	No. Ea	L	W	Crack LF	Caulk LF
Dbl Hng Met	91	72	63	2,525	2,048
Door - Dbl	2	60	84	62	48
Door-Single	9	36	84	180	180
Total				2,767	2,276

ENERGY SAVINGS CALCULATION:

Energy savings are determined per linear foot of crack in the preceding hand calculations. The energy savings per LF of crack is estimated at:

2.3 CFM/LF crack

Energy savings will actually be only 1/2 of this amount due to conservation of mass: infiltrating exterior air displaces conditioned air. Thus, infiltration may come in one side of the building while exfiltration occurs on the other side.

For weatherstripping, thus, assume:

1.15 CFM/LF crack

Heating energy is lost between the temperature of the outside air and the conditioned air. Assume conditioned space is at 72 Degrees, the heat losses are a function of the building schedule.

Contact March Ma	Fac	HVACEC	HVAC ECO Applicability	illty .				ECO AT	ECO A1 Energy Savings	nds	ECO A1	-nergy Co	ECO A1 Energy Cost Savings N (Years)	N (Years)	5	Cost Analysis	Sis		
Variation Value	Š	ECO A1	ECO A1		Total	Heat Ld	Heat	Electric	Propane	Fuel Oil	Electric	Propane	Fuel Oil	Total	1	Constr	Investmnt	Pavbac	SIR
Vea 200		Whrstrip	Caulk	Crack LF		BTUH	FLH/Yr	kWH/Yr		Mil BTU/Yr	\$/Year			\$/Year		Cost \$		Years	5
Yea Bidg altonative 1440	16	Yes	Yes	202	156	12,429	1,480	_		·	0\$	\$22	\$0	\$22		\$1,257	\$1,402	63.9	0.07
Yes Well to call & see Well to call & see Well to call & see Well could be a be a be a beautiful & see Well could be a be a beautiful & see Well could beautiful & s	P 41A		Yes	Bldg almo	ost new		1,480					·	•		-	•	•	•	•
Vis. Bidg almost 1.480	P 41B			wait to ca	ulk & ws														
Ves Bidg almost raw 1.480	P 42A		Yes	Bldg almo	ost new		1,480				•	•	•	•	•	•	•	•	'
Yea Big attributed & Ave. wait to call & Ave.	P 42B			wait to ca	ulk & ws														
Ves Bidg affinion counts Average Avera	P 43A		Yes	Bldg almo	ost new		1,480				'	<u>'</u>	·		•	•		•	'
Ver Bilds filtered it & ver 1400 Ver Bilds filtered it & ver Bilds filtered	P 43B			wait to ca	ulk & ws														
Yes	P 44A		Yes	Bldg almo	st new		1,480					•	·		•		-	•	
Ves Blog almost row 1480	P 44B			wait to car	ulk & ws														
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Year New well to C & was 1,480	P 45B			wait to car	ulk & ws														
Yea New; walt to call & was 1,400 Common of the call	P 46		Yes	New: wait	to c & ws		1,480								•	•	'		'
Yes Bidg afmost few walt to calk ave walt to calk	P 47		Yes	New: wait	to c & ws		1.480						•			•			'
Year Blank walf to call & was 1 and	P 51A		Yes	Bldg almo	ost new		1.480						ľ		•	•	•		'
Year Blidge linear new water to call & was 1,480 1,480 </td <td>P 51B</td> <td></td> <td></td> <td>wait to ca</td> <td>ulk & ws</td> <td></td>	P 51B			wait to ca	ulk & ws														
Year Newtwalt to c & was 1,480 1,480	P 52A		Yes	Bldg almo	st new		1,480						ŀ	•	•	•	•		
Yes New: walt to c & ws 1,480	P 52B			wait to can	ulk & ws														
Vee New: walt to C & ws 1,480	P 53		Yes	New: walt	to c & ws		1.480							•		•			
Ves New. wait to c & ws 1,480	P 54		Yes	New: walt	to c & ws		1.480						ľ		•	ŀ	ľ		'
Ves New. wait to © & ws 1,480	P 55		Yes	New: wait	to c & ws		1.480					Ī		•	ľ		,		
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Yes New: walf to c & ws 1,480 Company Company Section Sec	P 58		Yes	New: wait	to c & ws		1.480						•						'
Yes Yes Assistant of Sum 1480 See	P 59		Yes	New wait	10 C & WS		1 480												
Yes Yes <th>D 60</th> <th></th> <th>Yes</th> <th>New wait</th> <th>10 C & we</th> <th></th> <th>1 480</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>•</th> <th></th> <th>•</th> <th>•</th> <th>•</th> <th>•</th>	D 60		Yes	New wait	10 C & we		1 480							•		•	•	•	•
Yes Yes <th>20</th> <th>25,</th> <th>200</th> <th></th> <th></th> <th>00,0</th> <th>3</th> <th>33</th> <th></th> <th></th> <th></th> <th></th> <th>• </th> <th>•</th> <th>•</th> <th>•</th> <th>•</th> <th>•</th> <th>•</th>	20	25,	200			00,0	3	33					•	•	•	•	•	•	•
Yes Yes Tig 133 10,836 272 4.1 4.1 4.0 50 53.2 51.032 51.032 51.218 38.2 Yes 199 238 12,750 318 - 6.0 - 60 - 50 \$47 \$50 \$47 \$525 \$1.392 \$1,552 33.0 Yes 1,406 1,213 43,676 2,144 27,434 - 6.0 - \$2,045 \$0 \$47 \$0 \$47 \$2.045 \$1.392 \$1,070 4.9 Yes Yes 1,276 1,070 - 6.0 - 82,045 \$0 \$2.045 \$2.045 \$2.918 \$1,001 4.9 Yes Yes 7 - 6.0 - 6.0 - 6.0 - 6.0 - 6.0 - 6.0 - 6.0 \$1.000 \$1.000 \$1.000 \$1.000 \$1.000 \$1.000 \$1.000 \$1.000 \$1.000 \$1.000 \$1.000 \$1.000 \$1.000 \$1.000 \$1.000 \$1.000 \$1.000 \$1.0000 <t< th=""><th>2 0</th><th>200</th><th>200</th><th>5</th><th>07</th><th>2,102</th><th>430</th><th>202</th><th></th><th>•</th><th>\$20</th><th></th><th>0\$</th><th>\$20</th><th>\$30</th><th>\$215</th><th>\$239</th><th>12.0</th><th>0.000</th></t<>	2 0	200	200	5	07	2,102	430	202		•	\$20		0\$	\$20	\$30	\$215	\$239	12.0	0.000
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Yes Yes <th>5</th> <th>∀93</th> <th></th> <th>199</th> <th>238</th> <th>12,750</th> <th>318</th> <th>•</th> <th>0.9</th> <th>٠</th> <th>0\$</th> <th>\$47</th> <th>\$0</th> <th>\$47</th> <th>\$225</th> <th>\$1,392</th> <th>\$1,552</th> <th>33.0</th> <th>0.145</th>	5	∀93		199	238	12,750	318	•	0.9	٠	0\$	\$47	\$0	\$47	\$225	\$1,392	\$1,552	33.0	0.145
Yes Yes <th></th> <th></th> <th></th> <th>271</th> <th>214</th> <th>16,677</th> <th>475</th> <th>٠</th> <th>11.7</th> <th>١</th> <th>9</th> <th></th> <th>9</th> <th>\$92</th> <th>\$440</th> <th>\$1,693</th> <th>\$1,887</th> <th>20.5</th> <th>0.233</th>				271	214	16,677	475	٠	11.7	١	9		9	\$92	\$440	\$1,693	\$1,887	20.5	0.233
Yes Yes Yes Yes Yes 1070 33.065 1,364 <th></th> <th></th> <th></th> <th>1,408</th> <th>1,213</th> <th>43,676</th> <th>2,144</th> <th>27,434</th> <th>•</th> <th>•</th> <th>\$2,045</th> <th></th> <th>\$0</th> <th>\$2,045</th> <th>\$9,182</th> <th>\$8,985</th> <th>\$10,018</th> <th>4.9</th> <th>0.916</th>				1,408	1,213	43,676	2,144	27,434	•	•	\$2,045		\$0	\$2,045	\$9,182	\$8,985	\$10,018	4.9	0.916
Yes Yes 676 3,859 1,364 -	P 116						745				'				•	•		•	'
Yes Yes <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>1,070</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							1,070						-						
Yes Yes <td>T 120</td> <td>Yes</td> <td>Yes</td> <td>0</td> <td>929</td> <td>3,859</td> <td>1,364</td> <td></td> <td></td> <td></td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> <td>•</td> <td>-</td> <td>-</td> <td>•</td> <td>'</td>	T 120	Yes	Yes	0	929	3,859	1,364				•	•	•	•	•	-	-	•	'
Yes Yes <td></td>																			
Yes Yes 537 417 33,065 1,480 - 75.3 - \$6 \$593 \$2,838 \$3,347 \$3,732 6.3 Yes Yes 262 232 16,294 1,364 - 34.7 - \$0 \$273 \$0 \$273 \$1,309 \$1,684 \$1,877 6.9 Yes Yes 0 1,456 8,318 1,364 - 15.5 - \$0 \$122 \$122 \$160 \$2,606<	T 121						911					'	•	•		•	•	'	'
Yes Yes 262 232 16,294 1,364 - 34.7 - \$0 \$273 \$0 \$273 \$1,309 \$1,684 \$1,877 6.9 Yes 0 1,456 8,318 1,364 - 15.5 - 16.0 - 10.0 - 10.0 579 \$79 \$79 \$79 \$377 \$417 \$4 5 <td< td=""><td>T 124</td><td>Yes</td><td>Yes</td><td>537</td><td>417</td><td>33,065</td><td>1,480</td><td> </td><td>75.3</td><td> </td><td>\$0</td><td>\$593</td><td>\$0</td><td>\$593</td><td>\$2.838</td><td>\$3.347</td><td>\$3.732</td><td>6.3</td><td>0.761</td></td<>	T 124	Yes	Yes	537	417	33,065	1,480		75.3		\$0	\$593	\$0	\$593	\$2.838	\$3.347	\$3.732	6.3	0.761
Yes 0 1,456 8,318 1,364 - 15.5 - \$0 \$122 \$0 \$122 \$6 \$2,606 \$2,7 Yes 67 52 4,123 1,480 - 10.0 - \$0 \$79 \$79 \$377 \$417 \$4	T 127	Yes	Yes	262	232	16,294	1,364	ľ	34.7	•	25	\$273	\$0	\$273	\$1,309	\$1,684	\$1.877	6.9	0.697
Yes 67 52 4,123 1,480 - 10.0 - \$0 \$79 \$0 \$79 \$377 \$417 \$4 5.9	P 128		Yes	0	1,456	8,318	1,364	•	15.5		0\$	\$122	\$	\$122	\$586	\$2,606	\$2,	23.8	0.202
	T 131	X	Yes	29	52	4.123	1.480	•	10.0		\$0	879	0\$	62\$	\$377	\$417	6	5.9	0.811
		•	•	-	-			-)	, =		- •	- - -	= · · ·	- : :	<u> </u>	-	!

RCO AI 0.113 0.336 0.402 0.406 0.113 0.124 0.107 0.146 0.113 0.405 0.401 0.113 SIR 0.761 14.2 6.3 42.2 42.2 42.2 42.2 42.2 42.2 44.5 13.5 11.8 11.9 11.9 11.7 32.8 42.2 38.7 Paybac \$2,342 \$1,115 \$1,920 \$599 \$599 \$599 \$599 \$599 \$16,464 \$599 \$599 \$567 \$16,464 \$16,464 \$16,464 \$16,464 Investmnt Cost Analysis \$2,100 \$1,000 \$14,766 \$14,766 Constr \$508 \$719 \$1,722 \$14,766 \$14,766 \$14,766 Cost \$ \$537 \$537 \$537 \$537 \$537 \$537 \$537 ٠, \$682 \$5,531 \$6,596 \$6,615 \$6,686 \$68 \$68 \$68 \$68 \$68 \$70 \$6,664 2 \$342 \$68 ပ္ပ \$ Saved \$15 \$18 \$142 \$1,383 \$1,402 \$14 \$1,159 \$1,387 \$/Үөаг \$14 \$14 \$14 \$14 \$1,397 \$71 \$177 \$14 ECO A1 Energy Cost Savings N (Years) \$1,402 \$1,159 \$1,383 \$/Үөаг 2 2 2 2 2 2 S \$18 \$1,397 \$1,387 S S Ş Fuel Oil Propane \$/Year \$0 \$14 \$15 \$142 ဒ္ဓ S \$14 \$14 \$14 \$14 8 င္အ \$71 \$177 \$/Year 2 2 S င္အ Electric \$0 2 2 8 8 8 8 S Q S 2 2 Ş Ş 281.5 3.6 232.8 280.5 277.7 278.5 Electric Propane Fuel Oil kWH/Yr Mil BTU/Yr Mil BTU/Yr ECO A1 Energy Savings 22.5 8 1.8 1.8 6. 1.8 6. 18.1 6. 6. 9.1 FLHA 756 756 756 756 756 756 756 756 ,022 568 756 953 2,626 1,364 756 756 1,163 2,626 453 756 1,364 1,480 0 392 1,137 2,626 1,364 1,364 Heat 281 281 146,849 146,849 146,849 2,295 146,849 146,849 BTUH 20,027 1,714 1,714 1,714 1,714 1,623 9,881 Heat Ld New Renov good and Crack LF Caulk L. .
NA: Bldg not used Total 1,779 1,779 1,779 1,779 1,779 125 8 8 8 8 8 8 8 HVAC energy use NA: Not enough Ne X New New Ne X 2,393 2,393 Total 2,393 2,393 2,393 320 160 A N S HVAC ECO Applicability ECO A1 Caulk Yes Уөв Yes Yes Yes Yes Yes Yes Yes Yes ¥**6**8 Yes Yes Yes Yes ECO A1 Whrstrip Yөз Yөз Yes Yes Yes **Yes** ¥es Yes Yes Yes **Y**83 **∀**es P 230A P 229A P 208A P 205A S 186 P 207 P 207A P 208 P 209 P 210 P 212 P 219 P 229 P 230 \$ 235 S 236 S 237 S 168 P 178 S 182 P 190 S 197 S 198 P 205 206 S 144 S 146 T 149 166 r 172 156 T 158 . 163 . 163 \$ 165 P 177 T 161 167

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ECO Al Sheet 11 of 14

Fac	Fac HVAC ECO Applicability	O Applicat	oility				ECO A1 E	Energy Savings	ngs	ECO A1 E	nergy Cos	ECO A1 Energy Cost Savings N (Years)	N (Years)	5	Cost Analysis	sis		
Š	ECO A1	ECO A1	Total	_	Heat Ld	Heat	Electric	Propane	Fuel Oil	Electric	Propane	Fuel Oil	Total	သ	Constr	Investmnt	Paybac	SIR
	Whrstrip	Caulk	Crack LF	Caulk LF	BTUH	FLH/Yr KWH/Yr	kWH/Yr	Mil BTU/Yr	Mil BTU/Yr	\$/Үөаг	\$/Уваг	\$/Year	\$/Year	\$ Saved	Cost \$	€9	Years	
S 238						756				•	•	•		•	,	•	,	
P 240						756				-	·	•		•	-	•	•	'
S 241		Уөз	278	254	17,334	756	•	19.7	•	0\$	\$155	O\$	\$155	\$743	\$1,800	\$2,008	12.9	0.370
S 243						756					٠	•		•	1	,	•	•
S 244						95/					•	•	•	•	•	•	•	·
S 246						992					ľ	•	•	•	•	1	•	•
S 247						95/					·	·	•	•	•	•	•	•
P 252	Уөз	Yes	348	291	21,537	625	•	•	18.4	0\$	0\$	\$92	\$92	\$438	\$2,205	\$2,459	26.8	0.178
P 256	Yes	Уөв	324	258	19,985	625	•	-	17.4	\$	Çş	\$87	\$87	\$414	\$2,030	\$2,264	26.1	0.183
P 259	Yes	Уөз	850	724	52,691	625	•	•	44.6	0\$	0 \$	\$222	\$222	\$1,059	\$5,411	\$6,033	27.2	0.176
S 283						288					,			•		•	1	'
S 286						756					ľ	<u> </u>		•	•		•	
P 287						410					•	•	•	•	٠	•	•	[
S 288						756					·	•	•	•	•	•	'	•
S 290	Yes	∀	288	260	17,951	756	•	21.3	•	0 \$	\$168	O \$	\$168	\$802	\$1,861	\$2,075	12.4	0.387
S 291	Yes	Yes	171	160	10,684	756	•	13.5	•	0\$	\$106	0\$	\$106	\$509	\$1,114	\$1,242	11.7	0.410
P 295	Yes	Yes	2,767	2,276	171,099	1,364	٠	391.1	•	0\$	\$3,078	O\$	\$3,078	\$14,745	\$17,469	\$19,478	6.3	0.757
P 301						756					·	·	•	•	•	•	•	•
						2,626												
P 642						Ϋ́				•	·	•	•	•	•		•	
S 2201						125				•	-	-	_	•		•	٠	
Totals			20,889	21,397			27,703	670	1,435	\$2,065	\$5,271	\$7,146	\$14,483	609'89\$	\$138,215	\$154,110	10.6	0.445
															NO BUILDI	DINGS HAVE AN SIR	AN SIR >	c

				Date Prepared		Sheet 12 Of	14
CONSTRUCTION COST ES	TIMAT	Έ		February 1	1993		
Project			<u></u>	Project No.	Basis for	Estimate	
EEAP Limited Energy Study				<u> </u>	Code A	(no design comp	atad\
Fort Hunter-Liggett, California					Code A	(no design comp	sted)
Engineer-Architect							
Keller & Gannon Drawing No.		Estimat	OF .		Checked	Ву	
ECO# A-1 Caulk & Weatherstrip			BIH			•	
		antity		Labor	Per	/iaterial	Total
Line Item	No. Units	Unit Meas.	Per Unit	Total	Unit	Total	Cost
Weatherstripping	1	LF	\$1.89	\$1.89	\$1.19	\$1.19	\$3.08
Subtotal							\$3.08
Sales Tax at 8%			ļ				\$0.25
Subtotal					 		\$3.33
Contractor OH & P							\$1.00
Subtotal	_						\$4.32
Bond at 1%							\$0.04
Subtotal							\$4.37
Estimating Contingency at 10%					1		\$0.44
Total Probable Construction Cost	<u> </u>						\$4.80
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				Date Prepared		Sheet 13 Of	14
CONSTRUCTION COST EST	IIMAI	E		February	1993		
Project				Project No.	Basis for	Estimate	_
EEAP Limited Energy Study					٠		
Location Fort Hunter Liggett Colifornia					Code A	(no design comp	eted)
Fort Hunter-Liggett, California Engineer-Architect					1		
Keller & Gannon							
Drawing No.		Estimat			Checked	Ву	
ECO# A-1 Caulk & Weatherstrip			BIH				
Line Item	No. Units	untity Unit Meas.	Per Unit	Labor	Per Unit	Material Total	Total Cost
Caulking	1	LF	\$1.00	\$1.00	\$0.15	\$0.15	\$1.15
Subtotal							\$1.15
Sales Tax at 8%							\$0.09
Subtotal							\$1.24
Contractor OH & P							\$0.37
Subtotal							\$1.61
Bond at 1%							\$0.02
Subtotal]	\$1.63
Estimating Contingency at 10%							\$0.1€
Total Probable Construction Cost							\$1.79
					Ì		
	T						
						:	
	<u> </u>						

Life Cycle Cost Analysis Summary ECO A-1 Energy Conservation Investment Program (ECIP) Sheet 14 of 14

		nerstrip Doors and W	Region No. 4 /indows		Project No. 16-403-10 Fiscal Year FY96
	tion Name: ECO# e: March 1993	F A-1	Economic Life:	5 YEARS	Preparer: KELLER & GANNON
1. Investmen				_	•
A. Construct			\$138,215	•	
B. SIOH			\$7,602	-	
C. Design Co	ost		\$8,293	•	
_	t (1A+1B+1C)		\$154,110	•	
	alue of Existing E	auipment			
	lity Company Reb				
	estment (1D-1E-1F				\$154,110
0.50	i				
	avings (+)/Cost(-) IR 85-3273-X Use	: d for Discount Facto	ors	-	
Energy	Cost	Saving	Annual \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
A. Elec.	\$21.84	94.2	\$2,057	4.49	\$9,236
B. Dist	\$4.98	1435	\$7,146	4.77	\$34,088
C. Propane	\$7.87	670	\$5,273	4.79	\$25,257
D. Other			_		
E. Demand S	Savings				
F. Total			\$14,476		\$68,581
3. Non Energ	gy Savings (+) or	Cost (-):		-	
A. Annual Re	ecurring (+/-)		\$0	_	
(1) Discount	Factor (Table A)			4.45	
(2) Discount	ed Savings/Cost ((3A x 3A1)			\$ 0
B. Non Recu	ırring Savings (+)	or Cost (-)			
Itom	Savings(+)	Year of	Discount	Doscounted Sa	ıV-
item	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(
a.					
b.			-		
C.			_		-
d. Total	-				
C Total Non	Energy Discounte	ed Savings (3A2+3E	3d4)	\$0	
4. Simple Pa	ayback 1G/(2F3+	3A+(3Bd1/Economic	c Life)):	10.0	6 Years
	Discounted Savin		• •	\$68,58	1
	o Investment Ratio			0.4	5
	Internal Rate of Re			-20.86	%

Keller & Gannon

Engineers-Architects

COMPUTED BY BIH	ECO A2	PROJECT 16-403-10
DATE MARCH 1993	INSTALL DOUBLE	
REV 19	GLAZING - WINDOWS	SHEET NOOF SHEETS

Description

bouble glazed windows reduce heat.

transfer. Both space heating and cooling energy are saved. Double glazino, as a retrofit, requires a climate with below freezing winters and/or very warm summers.

Analysis

Basod on experience evaluating this type of project as a vetrofit at many beations of divergent climates, retrofiting FHL windows for double glazing will not be economic.

This project is not evaluated for FHL.

The facility Engineer is encouraged, however, to consider using double glazed panels for glass replacements when in conditioned spaces. Installation and materials costs are about the same as for standard pane glass as the manufacture of double glazed panels is automated.

Σ	Keller	&	Gannoi

Engineers-Architects

COMPUTED BY PUB	ECO A3	PROJECT 16-403-10
DATE MARCH 1913 REV19	INSULATE EXTENOR	SHEET NO OF 1 SHEETS
		**

DESCRIPTION OF ACTION

EXTERIOR IDAL INSULATION LILL BE HOLLIED

FACILITES IHCLUDED

BLDG 144 ECO HOT RECOMMENDED DUE TO BUILDING USE

156 ECO HOT RECOMMENDED TO BUILDING FLITCHION

1305- 177 **

1470 252 *

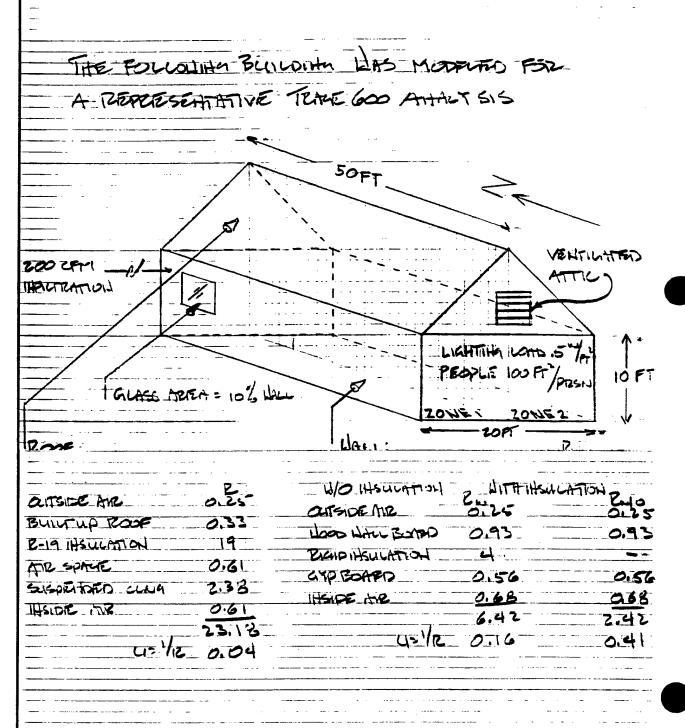
4 BUILDING AHALTSED LISHER PRETERMINE Trater 600 AHALTSIS

++ BUILDING FINDPINED USING TRACE 600

FORM 101-1/8

Keller & Gannon

Engineers-Architects



Ecot A-4

4111777 72514 PAGE 5

Trane Air Conditioning Economics By: Trane Customer Direct Service Network

Total

-37.2

PTAC - PACKAGED TERMINAL AIR COND. System Peak Mo/Hr: 7/18 Mo/Hr: 13/ 1 Mo/Hr: 7/18 Peaked at Time ==> OADB: 91 QADB: 27 OADB/WB/HR: 91/ 68/ 70.0 Outside Air ==> Space Peak Coil Peak Percnt Net Percnt * Space Percnt * Ret. Air Ret. Air Space Total Of Tot * Tot Sens Of Tot Sensible Of Tot * Space Sens Sensible Latent Sens.+Lat. (Btuh) (%) * (%) * (Btuh) (Btuh) (Btuh) (%) Envelope Loads (Btuh) (Btuh) (Btuh) 0 0.00 * 0 0.00 * 0 Q 0.00 Skylite Solr 0 0 0.00 * 0 a 0.00 * Λ 0.00 Skylite Cond 0 0 0.00 * 0 2,272 3.92 * 0 -1,468 5.16 Roof Cond 0 2,272 16,940 29.25 * 39.05 * 0 18.550 0 0.00 Glass Solar 16,940 0 2,002 3.46 * 3.21 * -6,291 -6,291 1,523 22.11 0 Glass Cond 2,002 30.702 53.01 * 23,224 48.89 * -16,474 -20,688 72.72 Wall Cond 24,108 6,594 0 0.00 * 0 0.00 * 0 0 0.00 Partition 0 0.00 * 0 0 0.00 * 0 0 0.00 Exposed Floor 0 0.00 * 0 0.00 * 0 0 0 0.00 Infiltration Ω 91.14 * 51,915 89.63 * -22,765 -28,447 Sub Total ==> 43.050 8,865 43,297 100.00 Internal Loads 2.95 * 3.59 * 1,707 a 1,707 0 0.00 1.707 0 Lights 7.42 * 3.79 * 0 4,300 4,300 1,800 0 0.00 People 0.00 * 0 0.00 * 0 ٥ 0 0.00 0 0 0 Hisc 7.38 * 6,007 10.37 * 0 Sub Total ==> 6.007 0 3.506 Ð 0.00 1.48 * -515 0.00 * 704 ٥ 0.00 Ceiling Load 812 -812 0 0.00 * 0.00 * 0 ٥ 0 0.00 Outside Air 0 0 0 0.00 * 0.00 * 0 0 0.00 Sup. Fan Heat 0.00 * 0 0.00 * 0 0.00 Ret. Fan Heat ٥ 0.00 * 0.00 * Duct Heat Pkup ٥ ٥ 0 0.00 0.00 * 0.00 * ٥ ٥ 0.00 OV/UNDR Sizing 0 0.00 * 0.00 * ٥ 0.00 0 Exhaust Heat 0 0 0.00 * 0.00 * 0.00 0 Terminal Bypass ٥ 0 -28,447 100.00 57,922 100.00 * 47,507 100.00 * -23,280 49,868 8,054 0 Grand Total ==> ------AREAS----------COOLING COIL SELECTION-----Total Capacity Sens Cap. Coil Airfl Entering DB/WB/HR Gross Total Glass (sf) (%) Leaving DB/WB/HR Deg F Deg F Grains Deg F Deg F Grains Floor 1,000 (Mbh) (cfm) (Tons) (Hbh) 55.4 77.5 63.3 66.9 61.2 57.3 66.0 Part 0 3,170 57.9 Main Clg 0.0 0.0 0.0 0.0 ExFir 0 0 0.0 0.0 Aux Clg 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Roof 1,000 0 0 0 0.0 0.0 Opt Vent 0.0 0.0 0.0 1,400 140 -: 10 Uall Totals 4.8 57.9 -----AIRFLOWS (cfm)------- ENGINEERING CHECKS----TEMPERATURES (F)---------HEATING COIL SELECTION-----Type + Clg Htg -Clg % QA 0.0 Cooling Heating Capacity Coil Airfl Ent Lvg Type -SADE 61.2 74.8 0 3.17 0 Clg Cfm/Sqft (Mbh) (cfm) Deg f Deg f Vent Plenum 77.6 63.7 0 Clg Cfm/Ton 656.65 63.9 74.8 0 Main Htg -37.2 3,170 Infil Clg Sqft/Ton 207.18 77.5 64.2 3,170 Return Aux Htg 0.0 0 0.0 0.0 Supply 3,170 Clg Btuh/Saft 57.92 Ret/QA 77.5 64.2 64.2 61.2 Hincfm 0 ۵ Preheat -0.0 3,170 Runernd 75.0 68.0 3,170 10 3,170 No. People Reheat 0.0 0 0.0 0.0 Return 0 0 Htg % CA 0.0 Fn MtrTD 0.0 0.0 0.0 0.0 Exhaust Humidif 0.0 3.17 Fn BidTD 0.0 0.0 ۵ Htg Cfm/Sqft 0.0 Rm Exh 0 Opt Vent 0.0 0.0 0 Htg Btuh/SqFt -37.22 Fn Frict 0.0 0.0

Auxil

部市时 40月14 EW 7-3 V 600 PAGE 7

Trane Air Conditioning Economics By: Trane Customer Direct Service Network

0.0

-20.5

Total

0

0.0

0.0

Rm Exh

Auxil

O

Htg Cfm/SqFt

Htg Btuh/SqFt -20.52

2.06

Fn BldTD 0.0

fn Frict 0.0

System Peak PTAC PACKAGED TERMINAL AIR COND. Peaked at Time *=> Mo/Hr: 7/18 Mo/Hr: 7/18 Mo/Hr: 13/ 1 Outside Air ==> OADB: 91 OADB/WB/HR: 91/ 68/ 70.0 QADB: 27 Net Percnt * Space Ret. Air Ret. Air Space Percnt * Space Peak Coil Peak Percnt Sens.+Lat. Total Of Tot Sensible Of Tot * Sensible Latent Space Sens Tot Sens Of Tot Envelope Loads (Btuh) (Btuh) (Btuh) (%) (Btuh) (%) * (Btuh) (Btuh) (Btuh) (%) Skylite Solr 0 0 0 0.00 0 0.00 * 0 ٥ 0.00 Skylite Cond 0.00 * n ٥ 0 0.00 0 ۵ 0 0.00 0.00 * Roof Cond 5.01 * 0 1,958 1,958 n 0 -1,508 9.47 56.57 * Glass Solar 18,550 0 18,550 47.42 * 18,550 0 0 0.00 Glass Cond 1,523 0 1,523 3.89 * 1,523 4.64 -6,291 -6,291 39.53 Wall Cond 28.33 26.44 8,671 2,410 11,081 8,671 -6,429 -8,117 51.00 Partition 0 0 0.00 ٥ 0.00 0 ٥ 0.00 Exposed Floor 0 0 0.00 O 0.00 0 n 0.00 Infiltration 0 0 0.00 0 0.00 a n 0.00 Sub Total ==> 84.65 28.744 4.369 33.112 28,744 87.66 -12,720 -15,916 100.00 Internal Loads 4.36 * Lights 1.707 O 1,707 1.707 5.20 * ٥ 0 0.00 People 4,300 10.99 * 5.49 4.300 1,800 0 0 0.00 Misc 0.00 * 0 0.00 * 0 0 0 0 0 0.00 Sub Total ==> 10.69 6,007 0 0 6,007 15.35 * 3,506 0 0.00 Ceiling Load 474 -474 0 0.00 * 540 1.65 * -418 0.00 Outside Air 0.00 * 0.00 * 0 0 0.00 Sup. Fan Heat 0.00 * 0.00 * 0.00 Ret. Fan Heat 0.00 * 0.00 0 0.00 Duct Heat Pkup 0 0 0.00 * 0.00 0.00 OV/UNDR Sizing 0 0.00 0.00 0 0 0.00 Exhaust Heat 0 0.00 0.00 0 0 0.00 Terminal Bypass 0 0 0.00 * 0.00 0 0 0.00 Grand Total==> 35,225 3.894 39,119 100.00 * 32,790 100.00 * -13,138 -15,916 100,00 ------COOLING COIL SELECTION----------AREAS-----Total Capacity Sens Cap. Coil Airfl Entering DB/WB/HR Leaving DB/WB/HR Gross Total Glass (sf) (%) 1,000 (Tons) (Mbh) (cfm) Deg F Deg F Grains Deg F Deg F Grains Floor (Mbh) Main Clg 62.9 3.3 39.1 36.6 2,064 76.5 66.9 60.3 56.6 64.8 Part 0 Aux Cla 0.0 0.0 0.0 ٥ 0.0 0.0 0.0 0.0 0.0 0.0 ExFlr 0 Opt Vent 0.0 0.0 0.0 ٥ 0.0 0.0 0.0 0.0 0.0 0.0 Roof 1,000 0 0 Totals 3.3 39.1 Wall 1,400 140 % 10 -----HEATING COIL SELECTION---------- AIRFLOWS (cfm)------- ENGINEERING CHECKS---- TEMPERATURES (F)---Capacity Coil Airfl Clg % OA Ent Type -. Cooling Heating 0.0 Type - Clg Htg = Lvg (Mbh) (cfm) Deg F 0 0 Clg Cfm/Sqft 2.06 SADE 60.3 73.9 Deg F Vent Main Htg -20.5 2,064 64.7 Infil 0 0 Clg Cfm/Ton 633.22 76.5 73.9 Plenum 64.7 Aux Htg 0.0 2.064 --0 0.0 2.064 Clg Sqft/Ton 306.76 76.5 65.0 0.0 Return Supply Preheat -0.0 ٥ 0 Clg Stuh/Sqft 39.12 Ret/QA 65.0 2,064 65.0 60.3 76.5 Mincfm Reheat 0.0 0 2,064 No. People Runarnd 75.0 0.0 0.0 Return 2,064 10 68.0 Humidif 0.0 0 0.0 0.0 Exhaust 0 n Htg % OA 0.0 Fn MtrTD 0.0 0.0 Opt Vent

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Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

BUILDING 177 (TECH LIBRARY)

FHL

FHL

KELLER AND GANNON

USE MODIFIED PASO ROBLES WEATHER DATA

Weather File Code:	PASORO	8L
Location:		
Latitude:	35.0	(deg)
Longitude:	120.0	(deg)
Time Zone:	8	
Elevation:	765	(ft)
Barometric Pressure:	29.1	(in. Hg)
Summer Clearness Number:	1.05	
Winter Clearness Number:	0.95	
Summer Design Dry Bulb:	100	(F)
Summer Design Wet Bulb:	70	(F)
Winter Design Dry Bulb:	27	(F)
Summer Ground Relectance:	0.20	
Winter Ground Relectance:	0.20	
Air Density:	0.0738	(Lbm/cuft)
Air Specific Heat:	0.2444	(Btu/lbm/F)
Density-Specific Heat Prod:	1.0829	(Btu-min./hr/cuft/F)
Latent Heat Factor:	4,766.9	(Btu-min./hr/cuft)

Design Simulation Period: June To November
System Simulation Period: January To December
Cooling Load Methodology: TETD/Time Averaging

Time/Date Program was Run:

16:25:49 3/ 7/93

4.4302 (Lb-min./hr/cuft)

Dataset Name:

Enthalpy Factor:

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-25.55

Htg Btuh/Sqft

Fn Frict

0.0

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Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

Total

-92.0

PTAC - PACKAGED TERMINAL AIR COND. System Peak Mo/Hr: 7/17 Mo/Hr: 13/ 1 Mo/Hr: 8/16 Peaked at Time ==> OAD8: 96 OAD8: 27 OADB/WB/HR: 95/ 72/ 84.0 Outside Air ==> Percnt * Space Peak Coil Peak Ret. Air Ret. Air Net Percnt * Space Percet Of Tot * Total Of Tot * Sensible Space Sens Tot Sens Of Tot Sens.+Lat. Sensible Latent Envelope Loads (Btuh) (Btuh) (Btuh) (Btuh) **(%)** (Btuh) (%) * (Btuh) (Btuh) (%) Skylite Solr 0 0 0 0.00 0 0.00 * 0 ۵ 0.00 0.00 * 0 0.00 * 0 0 0.00 Skylite Cond Ω n ۵ 0.00 * 2.69 * 0 0 -1.564 2.18 Roof Cond 0 3,527 3,527 68,239 60.20 * 49.87 ٥ Ω 0.00 Glass Solar 65,442 0 65,442 3.80 * 4,305 -14,073 4,512 3.44 * -14,073 19.62 Glass Cond 4,512 0 7.46 * 7,818 5.96 8,459 -22,628 -28,903 40.31 Wall Cond 6,225 1,594 0 0 0.00 0 0.00 * ٥ 0 0.00 Partition 0 0.00 0 0.00 * 0 0 0.00 n Exposed Floor 2.70 * 5,276 4.02 3,065 -8,880 -8,880 12.38 Infiltration 5.276 65.98 84,068 74.17 -45,581 -53,420 74.49 86,574 Sub Total ==> 81,454 5.121 Internal Loads 23.891 21.08 * 0 0.00 Lights 23,891 0 23,891 18.21 0 3,360 1,520 1.34 0 0 0.00 2.56 People 3,360 3,072 2.71 0 0 0.00 3,072 2.34 Misc 3,072 0 0 28,483 25.13 O 0 0.00 30,323 30,323 23.11 Sub Total ==> 0 0.71 * ٥ 801 -1.020 0.00 0 0.00 Ceiling Load 1,509 -1,509 14,997 0.00 * n -20,173 11.43 0 28.13 Outside Air 0 0 0.00 0.00 * 0 0.00 Sup. Fan Heat 0 0 0 0.00 0.00 * 0 0.00 Ret. Fan Heat 0.00 * 0.00 * 0 0.00 Duct Heat Pkup 0 0 0.00 * 0.00 * 0 0.00 0 OV/UNDR Sizing -0.51 * 0.00 * 1,883 -2.63 -674 -674 Exhaust Heat 0 Terminal Bypass 0.00 * 0 0.00 0 0.00 0 113,351 100.00 * -46,602 -71,711 100.00 Grand Total ==> 113,285 2,937 131,220 100.00 * ------COOLING COIL SELECTION----------AREAS-----Leaving DB/WB/HR Gross Total Glass (sf) (%) Entering DB/WB/HR Total Capacity Sens Cap. Coil Airfl Deg F Deg F Grains Floor 3.600 (Mbh) (Mbh) (cfm) Deg f Deg f Grains (Tons) 0 Main Clg 120.8 7,698 76.6 63.2 68.1 61.4 57.6 67.2 Part 10.9 131.2 0.0 0.0 0.0 0.0 Exflr ٥ Aux Clg 0.0 0.0 0.0 ۵ 0.0 0.0 Opt Vent 0.0 0.0 0.0 0 0.0 0.0 0.0 0.0 0.0 0.0 Roof 900 0 . 0 Wall 2,600 355 = 14 10.9 131.2 Totals -- TEMPERATURES (F)--------HEATING COIL SELECTION---------- AIRFLOWS (cfm)------- ENGINEERING CHECKS--Type - Cooling Cla % CA 8.5 Type - Clg . Htg -Capacity Coil Airfl Ent -Lvg Heating 651 454 . Clg Cfm/Sqft 2.14 SADB 61.4 73.6 . (Mbh) (cfm) Deg F Deg F Vent 200 703.98 76.3 64.7 200 --Clg Cfm/Ton Plenum Main Htg -92.0 7,698 62.6 73.6 Infil 7,698 329.22 75.6 65.1 7,696 Clg Sqft/Ton Return Aux Htg 0.0 0 0.0 0.0 Supply ٥ Clg Btuh/Sqft 36.45 Ret/QA 76.6 62.9 0 -0.0 7.698 61.9 **Hincfm** Preheat 7,648 7,698 No. People 8 Runernd 75.0 68.0 Reheat 0.0 0 0.0 0.0 Return 601 454 - Htg % OA 5.9 Fn MtrTD 0.0 0.0 Humidif 0.0 0.0 0.0 Exhaust Opt Vent 0.0 0 0.0 0.0 Rm Exh 100 -2 0 Htg Cfm/SqFt 2.14 Fn BldTD 0.0 0.0

Auxil

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Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

- PACKAGED TERMINAL AIR COND. System Peak PTAC Mo/Hr: 7/17 Mo/Hr: 13/ 1 Mo/Hr: 8/16 Peaked at Time ==> QADE: 96 OADB: 27 OADB/WB/HR: 95/ 72/ 84.0 Outside Air ==> Percnt * Net Percnt * Space Peak Coil Peak Percnt Space Ret. Air Ret. Air Space Of Tot * Total Of Tot * Space Sens Tot Sens Of Tot Sensible Sens.+Lat. Sensible Latent (%) * (Btuh) (%) (%) * (Btuh) (Btuh) (Btuh) (Btuh) Envelope Loads (Btuh) (Btuh) 0.00 * 0 O 0.00 0.00 * a 0 Skylite Solr 0 0 0.00 * 0.00 * Ω Δ ٥ 0.00 0 Skylite Cond 0 ٥ 0.00 * 2.70 3,525 2.79 * Λ 0 -1.595 Roof Cond 0 3,525 62.64 * 51.72 * 0 Ω 0.00 0 65,442 68,342 65.442 Glass Solar 3.97 * 4,334 -14,073 -14,073 24.58 4,512 3.57 * 4,512 0 Glass Cond 3.73 * -11,314 3,912 3.09 * 4,067 -14,526 25.37 800 Wall Cond 3,112 0.00 * 0 0.00 * 0 0 0 0.00 0 Partition 0 0.00 * 0 0.00 * 0 0 0.00 0 Exposed Floor 5,276 2.95 * -8,880 -8,880 15.51 4.17 * 3,222 Infiltration 5,276 65.34 * 79.965 73.29 * -34,267 -39.075 68.24 82,666 78,341 4,325 Sub Total==> Internal Loads 21.90 * 0.00 23,891 18.88 * 23.891 0 0 23.891 Lights 0.00 1,520 1.39 * ß 0 3,360 3,360 2.66 * People 2.82 * 0.00 n n 3,072 0 0 3.072 2.43 * 3,072 Misc 23.97 * 26.10 * 0.00 28.483 ٥ ٥ 30,323 Λ 30.323 Sub Total ==> 664 -0.61 * -644 -0 0.00 0 0.00 * Ceiling Load 1,470 -1,470 0.00 * 0 -19,403 33.89 11.15 * 0 14.104 Outside Air 0 0 0.00 * 0 0.00 0.00 - * 0 Sup. Fan Heat 0.00 * 0.00 * ٥ 0.00 -0 Ret. Fan Heat 0 0.00 * 0 0.00 0 0.00 * Duct Heat Pkup ٥ 0.00 * 0 0.00 0 0.00 * OV/UNDR Sizing 0 0.00 * 1,220 -2.13 -573 -0.45 * Exhaust Heat -573 0 0.00 * 0.00 * 0 0.00 ٥ Terminal Bypass 0 0 100.00 * -34,912 -57,258 100.00 126,520 100.00 * 109,111 . 0 Grand Total==> 110,134 2,282 -----AREAS-----------COOLING COIL SELECTION-----Leaving DB/WB/HR -Gross Total Glass-(sf) (%) Total Capacity Sens Cap. Coil Airfl Entering DB/WB/HR 3,600 Deg F Deg F Grains FLOOR Deg F Deg F Grains (Tons) (Mbh) (Mbh) (cfm) 63.2 68.1 61.4 57.6 66.9 Part 0 126.5 116.5 7,419 76.4 Main Clg 10.5 0.0 % 0.0 % 0.0 0.0 ExFir 0 0.0 0.0 0 0.0 0.0 Aux Clg 0.0 900 30 0 - 0 0 0.0 0.0 0.0 0.0 0.0 0.0 Roof 0.0 0.0 Opt Vent 0.0 Wall 2,600 355 7 14 10.5 126.5 Totals -- ENGINEERING CHECKS---- TEMPERATURES (F)---------HEATING COIL SELECTION----------AIRFLOWS (cfm)-----Type - Cooling - Heating Cla X OA 8.4 Type = Clg a Htg = Capacity Coil Airfl Ent ~ Lvg = 61.4: 72.3 622 🕶 437 Clg Cfm/Saft 2.06 SADS (Mbh) (cfm) Deg F Deg F Vent -65.6 200 - Clg Cfm/Ton 703.67 Plenum - 76.3 200 -7,419 - 63.7 Main Htg -69.8 72.3 Infil 7,419 Clg Sqft/Ton 341.45 Return 75.5 66.2 7,419 Aux Htg 0.0 0 0.0 0.0 Supply 0 Clg Btuh/Sqft 35.14 Ret/QA = 76.4 - 63.9 0 Preheat -0.0 7,419 62.9 61.4 Minefa Runernd 75.0 68.0 7,369 7,419 No. People 8 0.0 0 0.0 0.0 Return Reheat 572 -437 ~ Htg % QA 5.9 Fn MtrTD 0.0 0.0 0.0 0.0 Exhaust Humidif 0.0 0 2.06 Fn BldTD 0.0 0.0 Rm Exh 100 2 0 - Htg Cfm/SqFt 0 0.0 0.0 Opt Vent 0.0 Htg Btuh/\$qFt -19.40 Fn Frict 0.0 0.0 0 Auxil -69.8 Total

Keiler & Gannon

Engineers-Architects

	Engineers-Architects
COMPUTED BY PUB FCO# 1-3	PROJECT 19-4-03-10
DATE MARCH 1973 INSULATE FATERIOR WALLS	-FITL FEAR
REV	SHEET NO. SOF 14 SHEETS
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ITUDA 252	
COOLING!	
PASE LIHE 57,922	
ECO" A-2_ 39,119 1880	3 BTUIT/1000 SF
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= 19.3	Druh /SF
ASSUME TERM 10	
DWATTS = 13.8/ = 1.88	w/SF
THEATHY!	
TSASE LITTE 28447 BRUIT	4
ECOFA-3. 15916	12,531/1000
- BLD9 177	+ 12,5 PTUIT/SF
- COLINA!	
BAGELIUE 131220	
Eco* A-3 126520- 4700	2 3-01 14/27 00 65-
	BICH / S=
ASSUME BER- 10	
A WATTS - 1.3/10 = .13 W/SF	, · · · · · · · · · · · · · · · · · · ·
THIS LITE 71,711	
<u> </u>	453 BILLH 3300 SF
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			Date Presered		Sheet C Of	1.41
STIMAT	Ε		1	1993	S	14
			Project No.	Basis for	<u>I</u> Estimate	
			<u> </u>			
				Code A	(no design comp	eted)
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···	Estimeto	NT .		Checked	Ву	
Qu	undity !		Labor	ļ	(ateria)	· · · · · · · · · · · · · · · · · · ·
No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
_						
					\$8,294	\$19,994
2600	SF	\$5	\$13,000	\$4	\$9,360	\$22,360
_						\$42,354
1400	SE	\$ 5	\$6.300	¢3	\$4.466	\$10,766
						\$12,040
1400	3	ΨΟ.	Ψ7,000	Ψ-7	\$5,040	\$22,806
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	2600 2600	Quantity No. Unit	Countity No. Unit Per Unit	Cuantity Labor No. Unit Per Unit Total 2600 SF \$5 \$11,700 2600 SF \$5 \$13,000 1400 SF \$5 \$6,300	Estimator Checked	Estimator Checked By Code A (no design comp Checked By Check

			\$221		\$410	\$437	\$214			\$288	\$286	\$286	\$286	\$286	\$286	\$286		Γ			Ī						Γ			\$838		
	_	Total			L	L	L	L		L	L	L	L	L	L	L		L		L	L		L	L	L		L	L	L	L	L	
	Fuel Oil	\$/YR	O \$		9	\$	0\$			\$	2	2	\$	2	\$	2														\$436		
Savings	Propane	\$/YR	\$158		\$294	\$307	\$157			\$194	\$184	\$194	\$184	\$184	\$184	\$184														2		
	Electric	\$/YR	\$63		\$116	\$130	\$58			\$85	\$ 85	\$85	\$85	\$85	\$92	\$85														\$503		
	Fuel Oil	MBTU/Yr	0.0		0.0	0.0	0.0			0.0	0.0	0.0	00	0.0	0.0	0.0														87.6		
Savings	Propane	MBTU/Yr	20.1		37.4	39.0	19.9			24.7	24.7	24.7	24.7	24.7	24.7	24.7														0.0		
	Electric	Kwh/Yr	848		1,554	1,747	775			1,234	1,234	1,234	1,234	1,234	1,234	1,234														6,745		
	Fuelo	MBTU/Yr																												831.4		
Energy Use W/ECO-A4	Propane	MBTU/Yr	23.0		145.8	154.1	17.4			46.3	46.3	46.3	46.3	46.3	46.3	46.3														•		
Energy Use	Electric	Kwh/Yr	4,972		11,148	1,036	4,490			2,638	2,638	2,636	2,638	2,638	2,638	2,638														20,340		
ECO'S	Fuel Oil	MBTU/Yr																	3944.7	1375	1375	1375	1375							919		
Jse W/Previous ECO's	Propers	MBTU/Yr	44	768.5	183.2	183.1	37.3	52.5		71	1	7	14	۲	12	2	-	63.8						38.2	153	38.2	38.2	38.2	36.2		38.2	1040
Energy Use		Kwty	5,818	15,216	12,702	2,783	5,265	418	623	3,872	3,872	3,872	3,872	3,872	3,872	3,872	10,869	12,405	108,696	268,495		286,764	276,379	18,805	162,971	18,805	18,805	18,805	18,805	27,085	18,805	629,841
Heating		•	%0.99	%0.99	65.0%	64.0%	61.0%	80.78	¥	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	66.4%	65.0%	70.8%	71.4%	72.1%	71.9%	71.2%	87.0%	66.6%	80.78	% 0′ 29	87.0%	87.0%	73.0%	80.79	58.7%
Cooling	Degree	Hours	21,833	21,833	21,833	21,833	21,833	21,833	£00' 6	15,420	15,420	15,420	15,420	15,420	15,420	15,420	15,420	19,953	21,833	21,833	21,833	21,833	21,833	15,420	15,420	15,420	15,420	15,420	15,420	15,420	15,420	21,833
Heating	Degree	Hours	93,192	85,120	93,192	85,120	93,192	93,192	11,702	166,09	60,531	60,531	60,531	186,00	186,00	166,09	60,531	74,412	116,562	85,120	85,120	85,120	65,120	60,531	60,531	60,531	60,531	60,531	60,531	39,663	60,531	85,120
3	(SF)		1,090	9,120	2,001	2,250	866	7,172	2,025	2,250	2,250	2,250	2,250	2,250	2,250	2,250	3,599	3,599	16,768	27,238	26,999	26,692	36,063	3,000	10,000	3,000	3,000	3,000	3,000	12,299	3,000	41,002
Bidg			9	120	124	127	131	144	156	161	162	163	164	165	166	167	177	178	206	207	208	229	230	240	241	243	244	246	247	252	286	295

	Propane Fuel Oil		\$0 \$0 \$27		\$0 \$0				\$0 \$0 \$57	758 08 08	25\$ 0\$ 0\$	Ц	0\$	Q	60 80 857	873 St 08	0.8	&	8	Q	8	90 \$1,291	978 08 08	O.	04		2	22		2 2 2	222
Savings	_	+	\$327		\$81				827		123	Н		128		873	\$118	\sqcup	Н		Ц	\$1,291	878	Н		2.8		H	H		
S	Fuel Oil El	┸	0		0				0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	ļ	9	- 0		+++
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Savings	┝	┿	4,381		1,081				763	202	£	æ	8	æ	82	98	1,580	8,054	13,083	12,966	12,821	17,322	1,018	848	1,018	1,018	1,016		1,016	1,016	1,018
-	Fuel Oil	2010									l						_														
Energy Use W/ECO-AS	Propere	٠																										İ			
Energy Use	Electric		10,835		1,702				3,100	3,100	3,100	3,100	3,100	3,100	3,100	9,648	10,825	100,042	265,412	265,627	273,043	250,052	17,787	162,125	187,71	182'21	17,787		17,787	17,787	17,787
	1000	8														\$27														\$732	\$732
	Fuet Oil															Q.														\$436	2 2 3 3 3 3 3 3 3 3 3 3
	Properse	U / A														8														8	8
Savings	_															5														\$206	\$228
	Fuel Oil	MBIU/T														•							L			L				8	8
	\vdash	MBIO/V	L													-	L			L		L				L				°	0
Savings	↓	NWI/Y								L	L					ş														3,962	3,962
2	FEEO	MBIU/V																		L										744	75
Energy Use W/ECO-A3	Properie	MBIU/Y														88			L												\coprod
Energy U.	Electric	Kwp/Yr														10.629														16,378	16,378
Bido			8	22	127	2	<u> </u>	3	2	29	5	2	59	2	200	14	5	8	8	8	8	8	240	2	3	72	5	١	2	ž ž	2 2 2

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-		Total		\$242		09\$				\$42	\$45	\$45	\$42	\$42	\$45	\$42	\$68	\$87						\$56	\$47	\$56	\$56	\$56	\$56		\$56		
	Fuel Oil	\$/YR		\$0		\$0				\$0	\$0	\$0	\$0	\$0	\$0	\$0	0\$	\$0						\$0	\$0	\$0	\$0	\$0	\$0		\$0		0
	Propane	\$/YR		0\$		\$0				\$0	S	9	0\$	\$	0\$	Ş	0\$	05						0\$	0\$	S.	0\$	OS	050		\$0		0
Savings	Electric	\$/YR		\$242		\$60				\$42	\$42	\$42	\$42	\$42	\$42	\$42	\$68	\$87						\$56	\$47	\$56	\$56	\$56	\$56		\$56		\$1,138
	Fuel Oil	MBTU/Yr		0.0		0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0		0.0		0
	Propane	MBTU/Yr		0.0		0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0		0.0		0
Savings	Electric	Kwh/Yr		3,252		802				295	567	567	267	287	267	287	906	1,173						756	630	756	756	756	756		756		15,264
	Fuel Oil	MBTU/Yr																															
W/ECO-A7	Propane	MBTU/Yr																															
Energy Use	Electric	Kwh/Yr		7,583		900				2,542	2,542	2,542	2,542	2,542	2,542	2,542	8,742	9,652						17,032	161,493	17,032	17,032	17,032	17,032		17,032		
Bldg			9	120	124	127	131	144	156	161	162	163	164	165	166	167	177	178	208	207	508	229	230	240	241	243	244	246	247	252	286	295	

ECO-A3 COST SAVINGS

Building	Construction Cost	O&M/YR	Total	Sales Tax	OH & P	Bond	Contingenc	Savings	SIR
177	\$42,354	\$0	\$42,354	\$45,742	\$59,465	090'09\$	990'99\$	\$259	0'0
252	\$22,806	\$	\$22,806	\$24,630	\$32,020	\$32,340	\$35,574	\$7,194	0.2

Construction Cost....Installed Cost

O&M/YR.....Yearly maintenance

Sales Tax.....8% of total

OH & P......Contractors overhead and profit 30%

Contingency......Estimators contingency 10% Bond.....1%

SIR.....Savings/(Cost+Maint*UPW)

Life Cycle Cost Analysis Summary ECO A-3 Energy Conservation Investment Program (ECIP) Sheet H of 14

Location: Project Title:	Fort Hunter Lig		Region No. 4			Project No. Fiscal Year	
Discrete Port	ion Name: ECO#	ŧ A-3					
Analysis Date	e: March 1993		Economic Life:	20	YEARS	Preparer: K	ELLER & GANNON
1. investmen	t Costs						
A. Constructi	on Costs		\$104,180	<u>-</u>			
B. SIOH			\$5,730	_			
C. Design Co	st		\$6,251				
	(1A+1B+1C)		\$116,161	_			
	alue of Existing E				<u></u>		
	ty Company Reb						
G. Total Inves	stment (1D-1E-1F	7)				\$116,1	51
	vings (+)/Cost(-)			_			
Date of NIST	R 85-3273-X Use	d for Discount Facto	ors	-			
Energy	Cost	Saving	Annual \$		Discount	Discounted	I
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)	
A. Elec.	\$21.84	14.0	\$305		14.53	\$4,43	
B. Dist	\$4.98	47	\$234		17.63	\$4,12	
C. Propane	\$7.87	1	\$8		18.59	. \$146	
D. Other E. Demand S			-			•	
F. Total	aviiigs		\$547	-	· · · · · · · · · · · · · · · · · · ·	\$8,70	9
3. Non Energ	y Savings (+) or	Cost (-):		-			
A. Annuai Re	curring (+/-)		\$0 -				
(1) Discount I	Factor (Table A)			•	13.59		
(2) Discounte	d Savings/Cost (3A x 3A1)				\$0	
B. Non Recur	ring Savings (+)	or Cost (-)					
item	Savings(+)	Year of	Discount		Doscounted Sav-		
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)		
a.			_				
b.			_				
C.							
d. Total							
C Total Non E	Energy Discounte	ed Savings (3A2+3B	d4)		\$0		
4. Simple Pay	/back 1G/(2F3+3	A+(3Bd1/Economic	: Life)):		212.3	Years	
5. Total Net D	iscounted Saving	gs (2F5+3C):			\$8,709		
-	Investment Ratio	•			0.07		
7. Adjusted in	ternal Rate of Re	turn (AIRR):			-16.38%		

Keller & Gannon

Engineers-Architects

COMPUTED BY B/H	ECO A4	PROJECT 16 - 403 - 10 FAL - IEAP
DATE HARCH 19 93	INSULATE CEILINGS/	
REV19	ROOFS	SHEET NO OF SHEETS

DESCRIPTION F METTON

BUILDING LINCH CURRENTLY PO HOT HAVE CEILING IHSULTINION.

FACILITIES HOLLIDES

PUDA 6X

101 - ECO HT EZCOL ENTOFO DUE TO MESTELLE HATCHE

124*

1274

131 4

144-ELD IN FORCE METDED DUE TO BUILDING USE

15 6-ELO HST RELITIMENDED DUE TO BUILDING FUNCTION

161 =

162 ×

252*

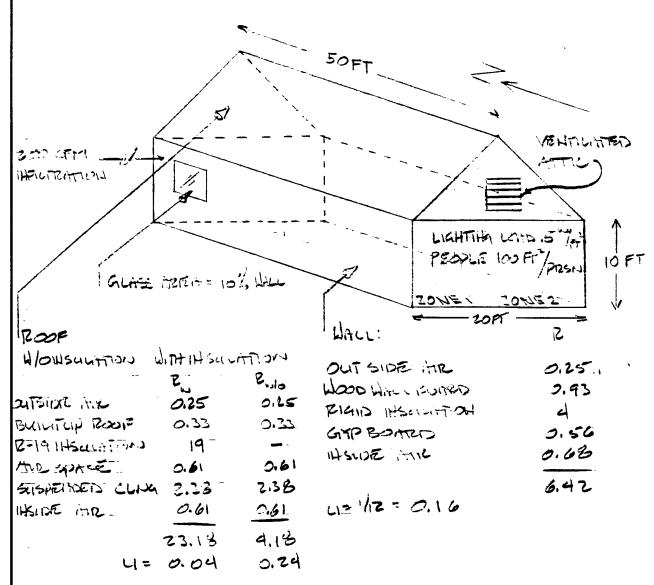
* BUILDAM AHARTSED LISHA BEARSENTHINE
TRACE 500 MAILTESS.

Keller & Gannon

Engineers-Architects

COMPUTED BY PJ3		PROJECT 19-403-10
CHECKED BY	77 7	
DATE 17TC+ 1913	HSULME SEILINGS LOTS	
REV 19	PER SOO NOVEL WELLEND IN	SHEET NO OF SHEETS

THE FULLOWING BUILDING LAS MUDEUTO FOR A PETERSENTINE TENTE SOD AMOUNT ON



51777 3 05 11 500 A CV 600 PAGE 3

PHOELIHE

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

System 1 Peak PTAC - PACKAGED TERMINAL AIR COND.

Peaked at				PEAK ****** 7/17			*	MO/N	r: /.	/10 -		MO/ HI'S	13/ 1	
Outside Ai	ir ==>	OAE	B/WB/HR:	96/ 70 / 70.0	1		*	OADI	B: 9	ĭ *		OAD8:	21	
			D-4 42-	Ret. Air	Net	Percnt	*	Spa	ce	Percnt *	Space Pea	ak Coil	Peak	Percnt
		Space	Ret. Air Sensible			Of Tot		Sensib	le	Of Tot *	Space Ser	ns Tot	Sens	Of Tot
		Sens.+Lat.			(Stuh)	(%)		(Btu	h)	(%) *	(Btul	1) (1	(Btuh)	(%)
Envelope L		(Btuh)	(8tuh) 0	*	0	0.00		•	0	0.00 *		0	0	0.00
Skylite		0	0		0	0.00			0	0.00 *		0	0	0.00
Skylite Roof Cor		0	14,919		14,919	21.75			0	0.00 *		0 -	7,898	22 .93
Glass So		15,120	0		15,120	22.04		16,9	40	35.17 *		0	0	0.00
Glass Co		2,421	0		2,421	3.53	*	2,0	02	4.16 *	-6,29	91 -	6,291	18.27
Wall Cor		23,987	6,143		30,130	43.92	*	24,1	80	50. 05 *	-16,47	74 -2	20,252	58 .80
Partitio		0	•,		0	0.00	*		0	0.00 *		0	0	0.00
Exposed		0			0	0.00	*		0	0.00 *		0	0	0.00
Infiltra		0			0	0.00	*		0	0.00 *		0	0	0.00
Sub Tota		41,528	21,062	•	62,590	91.24	*	43,0	50	89.37 *	-22,76	65 -3	54,440	100.00
Internal i		41,320	21,000				*			*				
Lights	Luaus	1,707	0	1	1,707	2,49	*	1,7	707	3.54 *		0	0	0.00
		4,300	•		4,300	6.27	•	1,8	100	3.74 *		0	0	0.00
People		0	0	0	0	0.00	*		0	0.00 *		0	0	0.00
Misc		_	0	_	6,007	8.76		3,5	06	7.28 *		0	0	0.00
Sub Tota		6,007	-1,961	-	0,000	0.00		1,6	14	3.35 *	-1,10	09	0	0.00
Ceiling Lo		1,961 0	-1,701	_	0	0.00		•	0	0.00 *		0	0	0.00
Outside A		U	•	•	0	0.00				0.00 *			0	0.00
Sup. fan i			0	1	0	0.00				0.00 *			0	0.00
Ret. Fan I			0		0	0.00	*			0.00 *			0	0.00
Duct Heat		0			0	0.00			0	0.00 *		0	0	0.00
OV/UNDR S	_	U	O	0	0	0.00				0.00 *			0	0.00
Exhaust Ho			0	_	0	0.00				0.00 *			0	0.00
Terminal I	Bypass		•	,			*			*				
Grand Tota	a (==>	49,496	19,100	0	68 ,596	100.00	*	48,1	70	100.00 *	-23,8	73 -:	34,440	100.00
			coc	LING COIL S							٧-4-	AREAS	_	
	Total	Capacity	Sens Cap.	Coil Airfl		ng DB/WB			-	/WB/HR	Gross Tota		lass (s	1) (*)
	(Tons)	(Hbh)	(Mbh)	(cfm)	•) F Gra			-	Grains	Floor	1,000		
Main Clg	5.7	68 .6	66.1	3,219	81.1 6	-	6.9		57.5	67.2	Part -	0		
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	ExFlr	0		
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	Roof	1,000		0 0
Totals	5.7	68.6									Vali	1,400		140 - 10
	HEATI	NG COIL SEL	ECTION		AII	RFLOWS (cfm)		E	NGINEERING	CHECKS			S (F)
	Capaci			Lvg -	Type ~	Cooling	, :	Heating	Clg	% CA	0.0	Туре	→ Clg	-
	(Mbh	•			Vent	()	0	Clg	Cfm/Sqft	3.22	SADB	61.	
Main Htg	-50		219 60.3		Infil	()	0	Clg	Cfm/Ton	563.16		- 81.	
Aux Htg		.0	0 0.0		Supply	3,219)	3,219	Clg	sqft/Ton	174.94	Return		
Preheat			219 60.7		Minefi)	0	Clg	Btuh/Sqft	68.60	Ret/OA		
Reheat		.0	0 0.0		Return	3,219	•	3,219	No.	People	10	Runarn		
Kumidif		.0	0 0.0		Exhaust	(0	Htg	% OA	0.0	Fn Mtr		
						(0	Htc	Cfm/SqFt	3.22	Fn Bld	TD 0.	0.0
Opt Vent	0	.0	0 0.0	0.0	Rm Exh	•	,	•		1 0100 04				

Ecot A-4

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

V 600 PAGE 5

System	1	Peak	PTAC	- PACKAGE	D TERMINAL A	AIR COND.	•					
					******	******	****			****** HEAT		
	nt Time =		-	7/18			*	Mo/Hr:	-		Mo/Hr: 13/	
Outside	Air ==>	O/	MDB/WB/HR:	91/ 68/ 7 0.	0		*	OADS:	91	*	OADB: 27	•
		Space	Ret. Air	Ret. Air	Net	· Percnt	*	Spece	Percnt	* Space Pea	k Coil Pe	ak Per c nt
		Sens.+Lat.	Sensible	Latent	Total	Of Tot	*	Sensible	Of Tot	* Space Sen	s Tot Se	ns Of Tot
Envelope	Loads	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)	*	(Btuh)	(%)	* (Btuh) (Stu	h) (%)
Skylit	e Solr	0	0		0	0.00	*	0	0.00	*	0	0.00
Skylit	e Cond	0	0		0	0.00	*	0	0.00	•	0	0.00
Roof C	ond	0	2,272		2,272	3.92	*	0	0.00	*	0 -1,4	68 5.16
Glass	Solar	16,940	0		16,940	29 .2 5	*	18,550	39 .05	*	0	0.00
Glass	Cond	2,002	0		2,002	3.46	.*	1,523	3.21	* -6,29	1 -6,2	91 22.11
Wall C	ond	24,108	6,594		30,702	53.01	*	23,224	48 .89	* -16,47	4 -20,6	88 72.72
Partit	ion	0			0	0.00	*	0	0.00	•	0	0.00
Expose	d Floor	0			0	0.00	*	0	0.00	•	0	0 0.00
Infilt	ration	0			0	0.00	*	0	0.00	•	0	0.00
Sub To	tal==>	43, 0 50	8, 8 65		51,915	89.63	*	43,297	91.14	• -22 ,7 6	5 -28,4	47 100.00
Internal	Loads						*		1	•		
Lights	.	1,707	0		1,707	2.95	*	1,707	3.59	•	0	0.00
People	•	4,300			4,300	7.42	*	1,800	3.79	b	0	0.00
Hisc		0	0	0	0	0.00	*	0	0.00	•	0	0.00
Sub To	tai==>	6,007	0	0	6,007	10.37	*	3,506	7.38	•	0	0.00
Ceiling	Load	812	-812		0	0.00	*	704	· 1.48 ¹	-51	5	0.00
Outside .	Air	0	0	0	0	0.00	*	0	0.00	• ,)	0.00
Sup. Fan	Heat				0	0.00	*		0.00	•		0.00
Ret. Fan	Heat		0		C	0.00	*		0.00	•		0.00
Duct Hea	t Pkup		0		0	0.00	*		0.00	•		0.00
OV/UNDR	Sizing	0			0	0.00	*	0	0.00	•)	0.00
Exhaust	Heat		0	0	0	0.00	*		0.00	•		0.00
Terminal	Bypass		0	0	0	0.00	*		0.00	•		0.00
Gr and To	tal==>	49,868	8,054	0	57 ,922	100.00	•	47,507	100.00	-23,280	-28,44	7 100 .00
			cool	.ING COIL SE	ELECTION						AREAS	•••••
	Total	Capacity	Sens Cap.	Coil Airfi	Enterin	g DB/WB/	HR	Leaving	DB/WB/HR	Gross Total	Glass	(sf) (%) T
	(Tons)	(Mbh)	(Mbh)	(cfm)	Deg F Deg	F Grain	ns	Deg F Deg	F Grains	Floor 1	,000	
ain Clg	4.8	57 .9	55.4	3,170	77.5 63	.3 66	.9	61.2 57.	.3 66.0	Part	0	
ux Clg	0.0	0.0	0.0	0	0.0 0	.0 0	.0	0.0 0.	0.0	ExFlr	0	
pt Vent	0.0	0.0	- 0.0	0	0.0 0	.0 . 0.	.0	0.0 0.	0.0	Roof · 1	,000	0 % 0
otals	4.8	57 .9								Wall 1	,400 ≖	140 # 10
			ECTION		AIR		fm)		-ENGINEERING	CHECKS	TEMPERATU	•-•
	Capeci	•		Lvg :	••	Cooling		_	ilg X CA =	0.0 ~		ilg 🦝 Htg 🕦
	(Mbh)	-	=		Vent -	•	•		lg Cfm/Sqft			1.2 _ 74.8
in Htg	-37.	•	170 63.9		Infil	0			lg Cfm/Ton		Plenum - 7	
ux litg		.0	0.0		Supply	3,170		-	lg Sqft/Ton			7.5 64.2
reheat	-0.	•	170 64.2		Minefm .	0	-		lg Btuh/Sqft		Ret/QA = 7	
eheat 		.0	0 0.0		Return	3,170		-	o. People			5.0 68.0
midif		.0	0.0		Exhaust	0			tg % OA			0.0 0.0
pt Vent		.0	0.0		Rm Exh	0			tg Cfm/SqFt			0.0 0.0
ot al	-37.	.z			Auxil	0		О Н	tg Stuh/SqFt	-37 .2 2	fn frict	0.0 0.0

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	Keller	Keller &

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	ECOF X=4	PROJECT 16-403-10
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BASELIHE		,
€, 0° A-4	57,922 10,6749	2724 /1000 SF
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	= 10.67 BT	TUHSF
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USII	ta ere. Billy out	
-	WATTS IN	
	Trs = BTU BTU .	15F
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	= 1.067 W/SF	
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- HEATWA:	and the second s	
BASTUNE	34440 BTUH	
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STEET 3 0F 11

	\vdash	Heating	Energy Use	Use W/Previous ECO's	П	Energy Use	Energy Use W/ECO-A4	1.1		Savings			Savings		
Degree Efficiency	deno	_	_	Propare	Fee Oil	Electric	Propane	Fuel Oil	Electric	Propane	Fuel Oil	Electric	Propane	Fuel Oil	
Hours			Kwh/Yr	MBTU/Yr	MBTU/Yr	Kwh/Yr	MBTU/Yr	MBTU/Yr	Kwh/Yr	MBTU/Yr	MBTU/Yr	\$∕YR	\$/YR	\$/YR	Total
21,833 66.0%	16.0%		5,818	44		4,972	23.9		848	20.1	0.0	\$63	\$158	0\$	\$221
21,833 66.0%	16.0%		15,216	768.5											
21,833 65.0%	15.0%		12,702	183.2		11,148	145.8		1,554	37.4	0.0	\$116	\$284	OŞ.	\$4 0
21,833 64.0%	4.0%		2,783	193.1		1,036	154.1		1,747	39.0	0.0	\$130	\$307	9	\$437
21,833 61.0%	1.0%	,	5,265	37.3		4,490	17.4	,	775	19.9	0.0	\$58	\$157	9	\$214
21,633 67.0%	7.0%		418	52.5											
9,003 NA	٧¥		823												
15,420 72.0%	72.0%		3,872	71		2,638	46.3		1,234	24.7	0.0	\$85	\$184	0\$	\$288
15,420 72.0%	72.0%		3,872	71		2,636	46.3		1,234	24.7	0.0	\$85	\$194	2	\$286
15,420 72.0%	2.0%		3,872	71		2,638	46.3		1,234	24.7	0.0	\$85	\$194	9	\$286
15,420 72.0%	Н		3,872	71		2,638	46.3		1,234	24.7	0.0	\$85	\$184	9	\$288
15,420 72.0%	75.0%		3,872	71		2,638	46.3		1,234	24.7	0.0	\$85	\$194	3	\$286
15,420 72.0%	Н) 1	3,872	11		2,638	46.3		1,234	24.7	0.0	\$85	\$184	9	\$286
	H		3,872	71		2,636	46.3		1,234	24.7	0.0	\$85	\$184	9	\$286
15,420 66.4%	Н		10,860	6.1											
19,953 65.0%	Н		12,405	63.8											
21,833 70.8%	H	ı – ı	969'80		3944.7										
21,833 71.4%			268,495		1375										
21,833 72.1%	Н				1375										
21,633 71.9%	Η		286,764		1375										
21,633 71.2%	1.2%		276,379		1375										
15,420 67.0%	17.0%		18,805	38.2											
15,420 66.6%	16.6%		162,971	163											
15,420 67.0%	35.0%		18,805	38.2											
15,420 67.0%	¥0.78		18,805	36.2											
15,420 67.0%	37.0%		18,805	38.2											
15,420 67.0%	17.0%		18,805	38.2											
15,420 73.0%	3.0%		27,085		919	20,340		831.4	6,745	0.0	87.6	\$503	0\$	\$436	\$939
15,420 67.0%	37.0%		16,805	38.2											
21,833 58.7%	18.7%		629,841	1040											
									20,308	289	88	\$1.514	\$2.275	\$436	

SHEET 70811 ECO A-d

Proparie Field OI Bactro Proparie Fuel OI Bactro Pro	9		┪	_			ŀ				21	W/ECO-AS		Savings			Savings			
Mail Out F. 0		E)		Propens		_	Propers	Fee Q		_		F. Q.	_	_	Fuel Of	Electric	Propene	Fuel Oil		
1,0,000 1,0,	MBIU/TE MBIU/TE KW	4-		\$	TA DIST		E S		MIN	9	L AMERICA	_	WBIU/VI	+		MB10/44	11/6	21.00	11.0	100
1,000 1,00				Γ							10,835			4,381		o	\$327	8	8	\$327
1,702 1,702 1,703 1,704 1,705 1,061 0 0 1,511 1,00				Γ																
1											1,702			1,081	٥	0	\$81	0\$	0\$	\$81
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4 5,109 7753 0 667 60 <th< td=""><td></td><td></td><td> </td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3,100</td><td></td><td></td><td>283</td><td>۰</td><td>°</td><td>\$57</td><td>0\$</td><td>S.</td><td>\$57</td></th<>											3,100			283	۰	°	\$57	0\$	S.	\$57
1											9,100			£	•	0	198	08	8	153
4 4 4 4 4 4 4 6											3,100			£		0	182	08	0\$	153
4 5,100 753 0 6 657 60 80 1 1 8,100 773 0 0 657 60 857 80 80 1 1 8,100 773 0 0 657 80											3,100			æ		٥	\$57	08	Q.	\$57
4 6 5,100 753 0 657 60 6											3,100			£		°	193	8	8	153
1 0 \$150 0 753 0 \$677 \$90		-									3,100			282	٥	•	198	Ş	8	\$57
1 0 \$16 \$20 \$16 600 0 \$173 \$00 \$0 \$173 \$00 \$0											3,100			22		0	29\$	Q	8	\$57
1	5.00	- -		240	-	•	816	8	8	123	9,648			86	٥	0	873	8	8	873
4 100,642 6,054 0 6,054 0 6,054 0 6,054 0 6,054 0 6,054 0 6,054 0 0 6,054 0 0 6,054 0 0 6,054 0 0 6,054 0 0 6,054 0 0 6,054 0 0 6,054 0 0 0 6,054 0 0 0 6,054 0 0 0 6,054 0 0 0 6,054 0 0 0 6,054 0 0 0 6,054 0 <th< td=""><td></td><td></td><td>,</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>10,825</td><td></td><td></td><td>1,580</td><td>0</td><td>0</td><td>\$118</td><td>Q</td><td>0\$</td><td>\$118</td></th<>			,								10,825			1,580	0	0	\$118	Q	0\$	\$118
The color The											100,642			8,054	0	0	008	0\$	26	009\$
Month State											255,412			13,083	0	0	8976	8	8	92.64
The color The											255,527			12,988		0	2988	O\$	0\$	290\$
Mathematical Control Co			, ,								273,943			12,821	٥	0	998	Q	8	956\$
17,787 1,016 0 0 8778 90 10 8778 90 90 90 90 90 90 90 9											259,057			17,322	0	0	\$1,291	8	0\$	\$1,291
The color of the			,								17,787			1,018	0	0	9/8	0	Q	9.8
1,016 0 0 1,016 0 0 1,016 10 10 10 10 10 10 10			ļ I								162,123			848	0	0	538	Q	08	\$63
0 80 17,787 1,016 0 0 870 80 0 86 805 8436 8732 17,787 1,016 0 0 870 80 1 1 1 1,016 0 0 870 80 1 1 1,016 0 0 870 80 1 1 1,016 0 0 870 80 1 1 1,016 0 0 870 80 1 1 10,004 0 1,016 0 1,016 1,016 1 1 1 10,004 0 1,016 1,016 1,016 1,016 1,016 1 1 1 1 1,016 0 0 1,016 1,016 1,016 1,016 1,016 1,016 1,016 1,016 1,016 1,016 1,016 1,016 1,016 1,016 1,016 1,016 1,016 <td></td> <td>17,787</td> <td></td> <td></td> <td>1,018</td> <td>0</td> <td>0</td> <td>878</td> <td>8</td> <td>8</td> <td>878</td>											17,787			1,018	0	0	878	8	8	878
0 68 \$200 \$6 \$6 \$70											17,787			1,018	0	0	878	\$	Q	878
0 66 6200 6400 \$732 17,787 1,016 0 0 \$78 \$90 1 1 1 1,018 0 0 2,77 1 <t< td=""><td></td><td></td><td>L</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>17,787</td><td></td><td></td><td>1,018</td><td></td><td>0</td><td>878</td><td>8</td><td>0</td><td>878</td></t<>			L								17,787			1,018		0	878	8	0	878
0 86 \$206 \$0 \$436 \$732 17,787 1,018 0 0 \$78 \$9 1 1 86 \$2313 \$436			L								17,787			910,	•	0	9/8	Q	Q	\$
17,787 1,016 0 0 \$78 \$0 10,147 19,684 0 0 \$1,468 \$0 11,468 \$23 \$436	- 744	747	L	3,962	•	93	\$206	8	8436	\$732										
1 10 10 10 10 10 10 10			L								17,787			1,018	0	0	\$78	0\$	0\$	878
i 88 \$313 \$9 \$436											610,147			19,664	0	0	\$1,468	0\$	0\$	\$1,468
				4,202	-	88	\$313	88	\$438					104,262	0	0	\$7,772	Q	Q	

		Total		\$242		\$60				\$42	\$42	\$42	\$42	\$42	\$42	\$42	\$68	\$87						\$56	\$188	\$56	\$56	\$56	\$56		\$56		
	Fuel Oil			0\$		\$0				\$0	\$	0\$	0\$	0\$	\$0	\$0	0\$	\$0						\$0	\$0	\$0	\$0	\$0	\$0		\$0		o
	Propane	\$/YR		\$0		0\$				0\$	0\$	S S	OŞ.	\$0	8	0\$	\$0	0\$						\$0	0\$	\$0	\$0	0\$	\$0		0\$		0
Savings	Electric	\$/YR		\$242		9\$				\$42	\$42	\$42	\$42	\$42	\$42	\$42	\$68	\$87						\$56	\$188	\$56	\$56	\$56	\$56		\$56		\$1,279
	Fuel Oil	MBTU/Yr		0.0		0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0		0.0		0
	Propane	MBTU/Yr		0.0		0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0		0.0		0
Savings	Electric	Kwh/Yr		3,252		802				267	267	267	267	267	295	292	906	1,173						756	2,519	756	756	756	756		756		17,153
	Fuel Oil	MBTU/Yr																															
W/ECO-A7	Propane	MBTU/Yr																															
Energy Use	Electric	Kwh/Yr		7,583		006				2,542	2,542	2,542	2,542	2,542	2,542	2,542	8,742	9,652						17,032	157,060	17,032	17,032	17,032	17,032		17,032		
Bldg			9	120	124	127	131	144	156	161	162	163	164	165	166	167	177	178	206	207	208	229	230	240	241	243	244	246	247	252	286	295	

CONSTRUCTION COST E	STIMAT			Date Prepared February	1993	Sheet Of	\I
Project				Project No.	Basis for	Estimate	
EEAP Limited Energy Study					Code A	(no design compe	rted)
Fort Hunter-Liggett, California]		•
Engineer-Architect							
Keller & Gannon		Estimat	Of		Checked	Ву	
ECO A-4 Insulate Ceilings/Roofs	_						
Line Item	No.	Unit Meas	Per Unit	Labor	Per Unit	Material Total	Total - Cost
Building 6	Units	Meas.	- Crinc	1000	- Oil	1000	- 0001
R-19 Batt Insulation	1090	SF	\$0.24	\$262	\$0.50	\$545	\$807
Subtotal Building 6	1.555						\$807
out							
Building 124							
R-19 Batt Insulation	2000	SF	\$0.24	\$480	\$0.50	\$1,000	\$1,480
Subtotal Building 124							\$1,480
						 	
Building 127		05	00.04	0540	CO EO	£1.10E	¢4 665
R-19 Batt Insulation	2250	SF	\$0.24	\$540	\$0.50	\$1,125	\$1,665
Subtotal Building 127							\$1,665
Building 131			 				
R-19 Batt Insulation	1000	SF	\$0.24	\$240	\$0.50	\$500	\$740
Subtotal Building 131							\$740
Building 161							
R-19 Batt Insulation	2250	SF	\$0.24	\$540	\$0.50	\$1,125	\$1,665
Subtotal Building 161		ļ	ļ			<u> </u>	\$1,665
Puilding 162				_		 	
Building 162 R-19 Batt Insulation	2250	SF	\$0.24	\$540	\$0.50	\$1,125	\$1,665
Subtotal Building 162		-	, , , , , , , , , , , , , , , , , , ,				\$1,665
Building 252							
R-19 Batt Insulation	12300	SF	\$0.24	\$2,952	\$0.50	\$6,150	\$9,102
Subtotal Building 252			ļ				\$9,102
						 	
				 		 	
					1		
					1		

			r-	1	, .	,	_	,	,	,	_	
SIR	2.4	2.4	2.3	2.5	5.	1.5	5.	5:	5.	5.5	1.5	6.0
Savings	\$3,003	\$5,571	\$5,938	\$2,908	\$3,887	\$3,887	\$3,887	\$3,887	\$3,887	\$3,887	\$3,887	\$12,761
Contingenc	\$1,259	\$2,309	\$2,597	\$1,154	\$2,597	\$2,597	\$2,597	\$2,597	\$2,597	\$2,597	\$2,597	\$14,198
Bond	\$1,144	\$2,099	\$2,361	\$1,049	\$2,361	\$2,361	\$2,361	\$2,361	\$2,361	\$2,361	\$2,361	\$12,907
OH&P	\$1,133	\$2,078	\$2,338	\$1,039	\$2,338	\$2,338	\$2,338	\$2,338	\$2,338	\$2,338	\$2,338	\$12,779
Sales Tax	\$872	\$1,598	\$1,798	\$799	\$1,798	\$1,798	\$1,798	\$1,798	\$1,798	\$1,798	\$1,798	\$9,830
Total	\$807	\$1,480	\$1,665	\$740	\$1,665	\$1,665	\$1,665	\$1,665	\$1,665	\$1,665	\$1,665	\$9,102
O&M/YR	\$0	\$0	\$0	\$ 0	\$0	\$0	0\$	0\$	\$	\$0	\$0	9
Construction Cost	\$807	\$1,480	\$1,665	\$740	\$1,665	\$1,665	\$1,665	\$1,665	\$1,665	\$1,665	\$1,665	\$9,102
Building	9	124	127	131	161	58	<u>홍</u>	2	165	1 86	167	252

ECO A-4 COST SAVINGS

Construction Cost....Installed Cost

O&M/YR.....Yearly maintenance scheduled as 2.5% of installed cost

Sales Tax.....8% of total

OH & P......Contractors overhead and profit 30%

Bond.....1%

Savings......Yearly savings multiplied by UPW factor for 20 years (13.59) Contingency......Estimators contingency 10%

SIR.....Savings/(Cost+Maint*UPW)

Life Cycle Cost Analysis Summary ECO A-4 Energy Conservation Investment Program (ECIP) Sheet ♣ of 11 | | |

Location:	Fort Hunter Lig		Region No. 4			Project No. 16-403-10 Fiscal Year FY96
	Insulate Ceilings					riscau fear F190
	tion Name: ECO#	€ A-4	=	00	YEARS	Preparer: KELLER & GANNON
Analysis Dat	e: March 1993		Economic Life:	20	TEARS	Preparer. NECLER & GARRIO
1. Investmer	nt Costs			-		
A. Construct	ion Costs		\$25,498	_		
B. SIOH			\$1,402	_		
C. Design C	ost		\$1,530	_		
D. Total Cos	t (1A+1B+1C)		\$28,430			
E. Salvage V	alue of Existing E	quipment				_
F. Public Uti	lity Company Reb	ate				
G. Total Inve	estment (1D-1E-1F	7)				\$28,430
2. Energy Sa	avings (+)/Cost(-)	:		_		
Date of NIST	IR 85-3273-X Use	d for Discount Facto	ors			
Energy	Cost	Saving	Annuai \$		Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
A. Elec.	\$21.84	69.0	\$1,507		14.53	\$21,896
B. Dist	\$4.98	88	\$438		17.63	\$7,726
C. Propane	\$7.87	289	\$2,274		18.59	\$42,282
D. Other						•
E. Demand 9	Savings			_		-:
F. Total			\$4,220			\$71,904
3. Non Ener	gy Savings (+) or	Cost (-):				
A. Annual Re	ecurring (+/-)		\$0 :	-		
(1) Discount	Factor (Table A)				13.59	
(2) Discount	ed Savings/Cost (3A x 3A1)				\$0
B. Non Recu	ırring Savings (+)	or Cost (-)				
lte m	Savings(+)	Year of	Discount		Doscounted Sav-	,
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)	
a.			_			
b. .						•
C.						
d. Total				_	_	
C Total Non	Energy Discounte	ed Savings (3A2+3B	d4)		\$0 🗵	
4. Simple Pa	yback 1G/(2F3+3	3A+(3Bd1/Economic	: Life)):		6.7	Years
•	Discounted Savin	•	• •		\$71,904	
	Investment Ratio				2,53	
المحفدينالية	ntomal Data of De	(AIDD):			13 70%	

Σ	Keller	&	Gannon

Engineers-Architects

COMPUTED BY 72173	FCO#-A5	PROJECT 16-403-10
CHECKED BY	Went of a constant	
DATE 17 19 19 19 19 19 19 19 19 19 19 19 19 19	THE TOUR TOUR	
REV 19	TENDECT TESCENTION	SHEET NO. 1 OF 1 SHEETS

TECHOPON FACTOR.

A SOLINE FROM LINE BE APPLIED TO THE LIMITORIS OF THE PURIOUS SELECTED.

THIS FROM LINE HAZIENCE THE LIMITORIS

REFLUENCEMENT MAN THUS DECREPTURE THE

OVER THE PARTIE HEAT TELLIFIED

THROUGH THE LIMITORY PROCEEDED THE SUMM.

THIS INTURH, LINE PECREPTURE THE

COUNDA LOAD CIT THE TELLIFORM SAVING.

FLECTRICAL USE OF THE MC FORIJOMENT.

FACILIDIES IHVOLVED

20%

BUDG 120	229	
127	230	
161	240	
162	241	
177	295	
178		
206		
207		

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY PJ7		Eco # A-5	Ś	PROJECT_\	9-473·10
DATE DATE	19-13	IHSTAL SU			
REV.	19	TEACE 500		SHEET NO.	OF T SHEETS
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					-
THE FUL	COLIH!	BUILDITH	1 LAS	MODELED F	512
			· · · · · · · · · · · · · · · · · · ·	<u> </u>	
A lacres	sett 13	TVE IET	a god p	11111C/212	
			50FT		
	/				
	//	3	-		
200 CFM					CALMUNAN
HALIRANUL					ATTICY
				LIGHTIHA	TE S PAT
		_/_b	5	PEOPLIE O	PT/PRSN TO FT
LWU155	1721217 =	10% HALL			
				ZONE	MAS- 1
ROOF			-Wace:	2081	2-
HOWSUUTTON .	JIM IHS	u LATION -	<u> </u>		
	2		Jour Side	· ·	0.25.
UTSIDE ME	_0.25	0.15	MODO HAL		0.93_
BUILTUP ROOF	•	22.0	PIGID IK	erunt on	4=
2-19 1Hsuration			GYP BOM	120	0.56
THE SPACE	0.61	0.61	1450E_2	nre	0:68
•		2.38_			(4)
susperious clue	_		1/2 -		6.42
HSIDE AIR	0.61	0.61	112 1/5 =	0.16	
	23.18	4.18	<u> </u>		
	0.04	0.24	1		
					· ·

V 600 PAGE 7

Trane Air Conditioning Economics By: Trane Customer Direct Service Network

-20.5

Total

- PACKAGED TERMINAL AIR COND. PTAC 1 Peak System Mo/Hr: 13/ 1 Mo/Hr: 7/18 Peaked at Time ==> Mo/Hr: 7/18 OAD8: 91 QAD8: '27 Outside Air ==> QADB/WB/HR: 91/ 68/ 70.0 Percnt * Space Peak Coil Peak Percnt Net Percnt * Space Ret. Air Ret. Air Space Of Tot * Space Sens Tot Sens Of Tot Sensible Total Of Tot * Latent Sens.+Lat. Sensible (%) * (Btuh) (%) :. (Btuh) (%) * (Btuh) (Btuh) (Btuh) (Btuh) Envelope Loads (Btuh) 0.00 * ٥ 0.00 * 0 0 0.00 0 0 Skylite Solr 0.00 * O O 0.00 0 0 0.00 * 0 Skylite Cond 0 0.00 * 0 -1,508 9.47 5.01 * 0 1,958 1,958 0 Roof Cond 56.57 * 18,550 47.42 * 18,550 Ω 0 0.00 0 18,550 Glass Solar 1,523 4.64 * -6,291 -6,291 39.53 3.89 * 1,523 0 1.523 Glass Cond 26.44 * 8.671 -6,429 -8,117 51.00 11,081 28.33 * 8,671 2.410 Wall Cond 0.00 * 0 0.00 ٥ 0.00 * Ð 0 Partition 0 0.00 * 0 0 0.00 0.00 * Ω Exposed Floor 0 0.00 * 0 0.00 * 0 ٥ 0.00 n Infiltration ٥ 28,744 -15,916 87.66 * -12,720 100.00 33,112 84.65 * 4,369 Sub Total ==> 28,744 Internal Loads 0 0.00 1.707 5.20 * 1,707 4.36 * 1.707 Lights 1,800 5.49 * 0 0 0.00 4,300 10.99 * People 4,300 0.00 0 0.00 * 0 0 0.00 -* 0 0 Hisc 3,506 0 0.00 10.69 * 6,007 15.35 * 6.007 0 Sub Total==> 1.65 * -418 0.00 540 ... 0 0.00 * -474 474 Ceiling Load 0 0 0.00 0.00 * 0.00 * 0 Λ 0 Outside Air O 0.00 0.00 * 0.00 * Sup. Fan Heat 0.00 O 0.00 * 0.00 * 0 0 Ret. Fan Heat n 0.00 0.00 * 0.00 * Duct Heat Pkup 0 0 0.00 0.00 * 0 0.00 * 0 OV/UNDR Sizing 0.00 0.00 * 0.00 * 0 0 0 0 Exhaust Heat 0.00 * 0.00 0.00 * ۵ 0 Terminal Synass -15,916 100.00 100.00 * -13,138 32,790 3,894 0 39,119 100.00 * 35,225 Grand Total==> ------ARFAS-----------COOLING COIL SELECTION-----Gross Total Glass=(sf) (%) = Entering DB/WB/HR Leaving DB/WB/HR Total Capacity Sens Cap. Coil Airfl Deg F Deg F Grains Deg F Deg F Grains Floor 1,000 = (cfm) (Tons) (Mbh) (Mbh.) 0 = 66.9. 60.3 56.6 64.8 Part: 2.064... 76.5 62.9 36.6 30.4 **Main Clg** 3.3 0.0 ... 0.0 0.0 0.0 0 7 0.0 0.0 0.0 Exflr 0.0 % Aux Clg 0.0 0.0 = 0.0 = 0.0 = 0.0 1,000 ₹ 0 42 0 0.0 Roof 0.0 . 0.0 0.0 0.0 Opt Vent 1,400-140-# 10 ¥ Uall. 3.3 30.1 Totals --TEMPERATURES (F)----- ENGINEERING CHECKS--------HEATING COIL SELECTION----------AIRFLOWS (cfm)-----0.0 Type= Cig 3. Htg = Type - Cooling Heating Clg X CA Capacity Coil Airfl Ent LVG # 2.06 ... SADE# 60.3... 73.9 0 > Clg Cfm/Sqft Deg F Deg F Vent 0 % (cfm) (Mbh) Plenum == 76.5 - 64.7 633.22 0 - Cig Cfm/Ton 0 % 2,064 64.7 73.9 Infil -20.5 Main Htg Return - 76.5 65.0 306.76 Supply 2,064 - Clg Sqft/Ton 2,064 > 0 0.0 0.0 Aux Htg 0.0 Ret/OA ≥ 76.5 - 65.0 39.12 0 🐱 Clg Stuh/Sqft 60.3 0 🗈 2,064 - 65.0 Minefm --0.0 Preheat 10 * Runernd * 75.0 5 68.0 2,064 - No. People 2.064 ---0.0 Return Reheat 0.0 0.0 Fn MtrTD ™ 0.0 € 0.0 .. 0 -0 🐔 Htg 🕱 CA 0.0 0 0.0 0.0 Exhaust Humidif 0.0 Fn 81dTD " 0.0 0.0 2.06 0 💠 0 - Htg Cfm/SqFt 0.0 0.0 Rm Exh 0.0 Opt Vent 0 Htg Stuh/SqFt -20.52 Fn-frict = 0.0 = 0.0

0 :

Auxil

ECO# A-4 ECO# A-3 ECO# A-5

SHEET GOF 13

V 600 PAGE 3

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

Total

-18.3

- PACKAGED TERMINAL AIR COND. Peak PTAC ***************** CLG SPACE PEAK ********* HEATING COIL PEAK ******** ****** COOLING COIL PEAK ***** Mo/Hr: 7/17 Mo/Hr: 13/ 1 Peaked at Time ==> Mo/Hr: 7/17 CADE: 96 OAD8: 27 Outside Air ==> OADB/WB/HR: 96/ 70/ 70.0 Net Percnt * Space Percnt * Space Peak | Coil Peak | Percnt Space Ret. Air Ret. Air Total Of Tot * Sensible Of Tot * Sens.+Lat. Sensible Latent Space Sens Tot Sens Of Tot (%) * (Btuh) (Btuh) (Btuh) (%) Envelope Loads (Btuh) (Btuh) (Btuh) (Stuh) (%) * 0.00 * ٥ 0.00 Skylite Solr 0 0 0 0.00 * 0 0 Skylite Cond 0 0.00 * 0 0.00 * 0 0 0.00 0 O 0.00 * Roof Cond 1,944 5.97 * 0 0 -1,499 10.08 0 1,944 37.63 * 46.44 * 12.250 Λ a 0.00 Glass Solar 12,250 0 12,250 4.87 * -5,253 Glass Cond 1,283 3.94 * 1,283 -5,253 35.35 1,283 0 32.87 * 34.00 * 8,671 -6,429 -8.107 54.56 Wall Cond 8,671 11.066 2.395 0.00 * 0 0.00 * O n 0.00 O Partition n 0.00 * 0.00 * 0 0 0 0.00 Exposed Floor n O 0.00 * 0 0.00 * 0 ٥ 0.00 0 Infiltration ٥ 84.17 * -11,682 81.55 * 22,205 -14,859 100,00 Sub Total ==> 22,205 4,340 26,544 Internal Loads 1,707 6.47 * 1.707 1,707 5.24 * 0 0 0.00. Lights 6.82 * People 4,300 4,300 13.21 * 1,800 0 0 0.00 0.00 * Misc 0 O 0 0.00 * 0 0 0 0.00 18.45 * 3,506 13.29 * 0 0.00 Sub Total ==> 6.007 0 6,007 668 -2.53 * -516 0.00 Ceiling Load 582 -582 0 0.00 * 0.00 * 0.00 -Outside Air 0.00 * 0 0 0 0 0.00 * 0.00 * 0.00 Sup. Fan Heat 0 0.00 * 0.00 * 0.00 Ret. Fan Heat 0 0 0.00 * 0 0.00 * 0.00 Duct Heat Pkup 0 0.00 * 0.00 * 0.00 OV/UNDR Sizing Ð 0.00 * 0.00 0.00 * Exhaust Heat 0 0 0.00 * 0.00 0.00 * Terminal Bypass 0 0 0 32,551 100.00 * 100.00 * -12,198 -14,859 100.00 26,379 Grand Total==> 28,793 3,757 ------COOLING COIL SELECTION------Total Capacity Sens Cap... Coil Airfi Entering DB/MB/MR Leaving DB/MB/HR Gross Total Glass (sf) (%) % Deg F Deg F Grains Deg F Deg F Grains Floor 1,000 (Tons) (Mbh) (Mbh) (cfm) Main Clg 59.8 56.3 64.2 Part · 0 2.7 32.6 30.1 1,602 76.9 63.1 66.9 0.0 0.0 0.0 ExFlr 0 -Aux Clg 0.0 0.0 0.0 0 -0.0 0.0 0.0 Opt Vent 0.0 0.0 0.0 0 . 0.0 - 0.0 0.0 . 0.0 . 0.0 . 0.0 2 Roof -1,000 -0 7 0 1,400 -140 = 10 = Totals 2.7 32.6 Vall. -- ENGINEERING CHECKS---- TEMPERATURES (F)---------HEATING COIL SELECTION---------- AIRFLOWS (cfm)-----Type .m. Cooling - Heating -0.0 Clg % CA Type= Clg & Htg Capacity Coil Airfl Ent * Lvg & (cfm)-0 ~ 0 - Clg Cfm/Sqft 1.60 - SADE 2 59.8 75.8 -Deg # Deg # (Mbh) Vent ** 0 Clg Cfm/Ton 590.46 Plenum = 76.8 = 64.5. 0 Main Htg -18.31,602 64.5 75.0 Infil 1,602 1,602 Clg Sqft/Ton 368.66 76.9 64.8 Return Aux Htg 0.0 0 0.0 0.0 Supply 0 f Clg Stuh/Sqft 32.55 Ret/OA - 76.9 64.8 Preheat 1,602 64.8 59.8 0 ... -0.0 Minefm " 10 % Runernd % 75.0 68.0 1,602 -1,602 No. People Reheat 0.0 0.0.0.0 Return 0 0 Htg % CA 0.0 Fn MtrTD 0.0 0.0 **Humidif** 0.0 0 0.0 - 0.0 Exhaust Opt Vent 0.0 0 0.0 0.0 Rm Exh :: 0 -0 - Htg Cfm/SqFt 1.60 Fn BldTD 0.0 2 0.0 4

0

Auxil

Htg Stuh/SqFt -18.31

fn Frict 0.0 0.0

Keller & Gannon

Engineers-Architects

COMPUTED BY 743	=co" A-5	PROJECT 16-403-10
DATE 19 13 REV. 19	THETENT CHECKICHTONIS	SHEET NO. 5 OF 13 SHEETS

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PASELIHE: 39,119

ECO* A-5 32,551 6,563 BTUH /1000 STE = 6,568 BTUH/SF

> ASSUME FAR = 10 A. LIMTS = 5.55% = 166 WHT/SE

SHEAT GORIS ECO A-S

Area	Heating	Cooling	Heating	Energy Use	Use W/Previous ECO's		Energy Use W/ECO-M	W/ECO-A4			Savings			Savings		
(SF)	Degree	Degree	Efficiency	Electric	Properse	Fuel Oil	Electrio	Propane	Fuel Oil	Electric	Propane	Fuel Oil	Electric	Propane	Fee	
	Hours	Hours		Kwh/Yr	MBTU/Yr	MBTU/Yr	Kwh/Yr	MBTU/Yr	MBTU/Yr	Kwh/Yr	MBTU/Yr	MBTU/Yr	#W#	\$/YR	\$/YR	Total
1,090	93,192	21,833	%0.99	5,818	44		4,972	23.9	•	846	20.1	0.0	\$63	\$158	0\$	\$221
9,120	65,120	21,833	%0'99	15,216	768.5											
2,001	93,192	21,833	%0'59	12,702	183.2		11,148	145.8	•	1,554	37.4	0.0	\$116	\$294	9	\$410
2,250	85,120	21,833	64.0%	2,783	193.1		1,036	154.1		1,747	39.0	0.0	\$130	\$307	9	\$437
966	93,192	21,833	% 0'19	5,265	37.3		4,490	17.4	•	775	19.9	0.0	\$58	\$157	9	\$214
7,172	93,192	21,833	%0'29	418	52.5											
2,025	11,702	800' 6	¥	623												
2,250	60,531	15,420	72.0%	3,872	71		2,638	46.3	•	1,234	24.7	0.0	\$92	\$194	\$0	\$288
2,250	60,531	15,420	72.0%	3,872	7		2,638	46.3		1,234	24.7	0.0	\$92	\$194	9	\$286
2,250	60,531	15,420	72.0%	3,872	7		2,638	46.3		1,234	24.7	0.0	\$92	\$104	\$ 0	\$286
2,250	60,531	15,420	72.0%	3,872	12		2,638	46.3		1,234	24.7	0.0	\$92	\$184	\$ 0	\$286
2,250	60,531	15,420	72.0%	3,872	71		2,638	46.3		1,234	24.7	0.0	\$95	\$184	\$0	\$288
2,250	60,531	15,420	72.0%	3,872	7		2,638	46.3		1,234	24.7	0.0	\$92	\$104	80	\$286
2,250	60,531	15,420	72.0%	3,872	71		2,638	46.3		1,234	24.7	0.0	\$05	\$194	\$0	\$286
3,599	60,531	15,420	%1.88	10,869	6.1											
3,599	74,412	19,953	%0°S9	12,405	63.8											
16,768	116,562	21,833	70.8%	108,696		3944.7										
27,238	85,120	21,833	71.4%	268,495		1375										
26,999	65,120	21,833	72.1%			1375										
26,692	85,120	21,833	71.9%	286,764		1375										
36,063	85,120	21,833	71.2%	276,379		1375										
3,000	60,531	15,420	%0'. 29	18,805	38.2											
10,000	60,531	15,420	89.99	162,971	163											
3,000	60,531	15,420	%0'. 29	18,805	38.2											
3,000	60,531	15,420	% 0′ 29	16,805	38.2											
3,000	60,531	15,420	% 0′ 29	18,805	38.2											
3,000	60,531	15,420	% 0′. 29	18,805	38.2											
12,299	39,663	15,420	73.0%	27,085		919	20,340	•	\$31.4	6,745	0.0	87.6	£02\$	0\$	\$436	\$939
3,000	60,531	15,420	82.0%	18,805	38.2											
41,002	85,120	21,833	58.7%	629,841	1040											
										20,308	588	88	\$1,514	\$2,275	\$436	
									4							

SHEET TOF 13 ELO A-S

		Total		/202		<u> </u>				227	\$57	\$57	298	198	158	123	228	81 18	000	\$975	1961	9508	\$1,291	£2	8	878	£78	870	2		878	\$1,468		•
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and and	Bectrio	Ę		1252	1	ž				72	198	\$57	198	198	1657	123	23	8 118	9000	8075	\$067	9908	\$1,201	876	8	878	878	878	2		878	\$1,468	87,772	
1	200	MBTU/Yr		9		9				•	0	0	•	0	0	•	0	•	0	0	•	0	°	0	0	0	•	0	0		0	0	0	
	Properse	MBTU/Y		•		٥				0	0	•	•	•	°	•	0	0	•	0	0	0	0	0	0	0	0	0	0		0	0	0	
Savings	Electric	Kwh/Yr		8,		1,081				202	202	æ	Ę	Ę	Ŗ	£	086	1,580	6,064	13,063	12,968	12,821	17,322	1,018	848	1,018	1,018	1,018	1,018		1,018	10,004	104,282	
	Fuel Oil	MBTU/Yr																																•
Energy Use W/ECO-AS	Properse	MBTU/m																																
Energy Use	Electric	Kwh/Yr		10,835		1,702				3,100	8,100	9,100	3,100	87.6	8,18	3,100	9,048	10,825	100,642	265,412	265,527	273,945	259,057	17,787	162,123	17,787	17,787	181,71	17,787		17,787	610,147		
		Total															123													8732				
	Fuel Oil	₽¥															2	+												8538			\$£38	
	Properte	EWB.															2													8	Į,		2	
Savings	Becato	E/VE															Ę													200			Sies	
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Sevings	Becelo	Kent, 77									-					T	3	-												3,982	=		4,202	
	2	METU/Ar																												744				
W/ECO-A:	Propera	MBTUR									Ī						8	-																
Energy Use W/ECO-A3	Beofile	Kwhyt															10.629													278.63				
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Fuel Oil							
		Propane	Fuel Oil	Electric	Propane	Fuel Oil	
MBTU/Yr	Kwh/Yr	MBTU/Yr	MBTU/Yr	\$/YR	\$/YR	\$/YR	Total
	3,252	0.0	0.0	\$242	\$0	\$0	\$242
	802	0.0	0.0	\$60	\$0	\$0	\$60
	-			. ~			
\vdash							
_							
\vdash	567	0.0	0.0	\$42	\$0	\$0	\$42
-	567	0.0	0.0	\$42	\$0	\$0	\$42
L_	267	0.0	0.0	\$45	\$0	\$0	\$42
	567	0.0	0.0	\$45	\$0	\$0	\$42
	587	0.0	0.0	\$42	\$0	\$0	\$42
	587	0.0	0.0	\$42	\$0	\$0	\$42
l i	287	0.0	0.0	\$42	\$0	\$0	\$42
	906	0.0	0.0	89\$	\$0	\$0	\$68
	1,173	0.0	0.0	\$87	\$0	\$0	\$87
1 1							
	756	0.0	0.0	\$56	0\$	0\$	\$56
	2,519	0.0	0.0	\$188	0\$	0\$	\$188
	758	0.0	0.0	\$58	\$0	\$0	\$56
	756	0.0	0.0	\$56	\$0	\$0	\$56
	756	0.0	0.0	\$56	0\$	0\$	\$56
Ш	756	0.0	0.0	92\$	0\$	0\$	\$56
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 	756	0.0	0.0	\$56	0\$	\$0	\$56
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Щ	47.450	O	0	\$1.279	0	0	

ECO12 A-5 COST SAVINGS

CONSTRUCTION COST	STIMAT	Ε		February	1993	Sheet G Of	13
Project EEAP Limited Energy Study				Project No.	Basis for	Estimate	
Location				<u> </u>	Code A	(no design comp	eted)
Fort Hunter-Liggett, California					-	,	•
Keller & Gannon							
Drawing No.		Estimet			Checked	*	
ECO# A-5 (Install Solar Film)			RJB	Labor		BIH Visterial	
Line Item	No. Units	Unit Meas.	Per Unit	Total -	Per Unit	Total -	Total = Cost #
Bldg 120						<u> </u>	
Solar Film	218	SF	\$2.28	\$497	\$2.97	\$647	\$1,145
Total Bldg 120							\$1,145
Bldg 127							
Solar Film	165	SF	\$2.28	\$376	\$2.97	\$490	\$866
Total Bldg 127							\$866
Bldg 161-167 (EA)							
Solar Film	200	SF	\$2.28	\$456	\$2.97	\$594	\$1,050
Total Bldg 161-167 (EA)							\$1,050
Bldg 177							
Solar Film	355	SF	\$2.28	\$809	\$2.97	\$1,054	\$1,864
Total Bldg 177							\$1,864
Bldg 178							
Solar Film	355	SF	\$2.28	\$809	\$2.97	\$1,054	\$1,864
Total Bidg 178			 	<u> </u>			\$1,864
Bldg 206		1	·				
Solar Film	1200	SF	\$2.28	\$2,736	\$2.97	\$3,564	\$6,300
Total Bldg 206							\$6,300
Bldg 207							
Solar Film	1200	SF	\$2.28	\$2,736	\$2.97	\$3,564	\$6,300
Total Bldg 207					3		\$6,300
Bldg 208	·						
Solar Film	1200	SF	\$2.28	\$2,736	\$2.97	\$3,564	\$6,300
Total Bidg 208			-			-	\$6,300
		<u> </u>					

ECO13 A-5 COST SAVINGS

CONSTRUCTION COS	T ESTIMAT	E		Pebruary	1993	Sheet \O Of	13
Project EEAP Limited Energy Stud	y			Project No.	Basis for	Estimate	
Fort Hunter-Liggett, Califor	nia				Code A	(no design comp	eted)
Keller & Gannon							
Drawing No.		Estimat			Checked	•	
ECO# A-5 (Install Solar Film)	1 00	antity	RJB	Labor	 ,	BIH Material	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Bldg 229							
Solar Film	1200	SF	\$2.28	\$2,736	\$2.97	\$3,564	\$6,300
Total Bldg 229							\$6,300
Bldg 230							
Solar Film	1200	SE	\$2.28	\$2,736	\$2.97	\$3,564	\$6,300
Total Bldg 230	1200	31	ΨΖ.ΖΟ	Ψ2,700	Ψ2.91	ψ3,304	\$6,300
10ta 5tag 200							Ψ0,000
Bldg 240							
Solar Film	240	SF	\$2.28	\$547	\$2.97	\$713	\$1,260
Total Bldg 240							\$1,260
Bldg 241		-					
Solar Film	56	SF	\$2.28	\$128	\$2.97	\$166	\$294
Total Bidg 241							\$294
Bidg 243							
Solar Film	240	SF	\$2.28	\$547	\$2.97	\$713	\$1,260
Total Bldg 243							\$1,260
Bidg 244				<u> </u>			
Solar Film	240	SF	\$2.28	\$547	\$2.97	\$713	\$1,260
Total Bldg 244	210	<u>. </u>	42.20	40	V 2.07		\$1,260
Bldg 246							
Solar Film	240	SF	\$2.28	\$547	\$2.97	\$713	\$1,260
Total Bldg 246					7	7	\$1,260
Bldg 247							
Solar Film	240	SF	\$2.28	\$547	\$2.97	\$713	\$1,260
Total Bldg 247	- : -			7			\$1,260

ECO14 A-5 COST SAVINGS

CONSTRUCTION COST	ESTIMAT	Ε		Pebruary	1993	Sheet Of	13
Project EEAP Limited Energy Study				Project No.	Basis for	Estimate	
Fort Hunter-Liggett, California					Code A	(no design com	peted)
					1		
Keller & Gannon		Estimat			Checked	Av	
Drawing No. ECO# A-5 (Install Solar Film)		Cammen	RJB		0.11.0.11.0.1	BIH	
ECO# A-5 (Install Solal Film)	Qu	antity		Labor		Actorial	
Line Rom	No. Units	Unit Meas.	Per Unit	Total	Per - Unit -	Total	Total ==: Cost ==
Bldg 286							
Solar Film	240	SF	\$2.28	\$547	\$2.97	\$713	\$1,260
Total Bldg 286							\$1,260
Bidg 295					 		
Solar Film	2866	SF	\$2.28	\$6,534	\$2.97	\$8,512	\$15,047
Total Bldg 295					1	-	\$15,047
	-						
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SIR	8.0	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.2	0.3	0.4	0.4	0.4	9.0	0.2	9.0	0.2	0.2	0.2	0.2	0.2	0.3
Savings	\$1,455	\$360	\$253	\$253	\$253	\$253	\$253	\$253	\$253	\$325	\$525	\$2,670	\$4,338	\$4,303	\$4,254	\$5,745	\$338	\$280	\$338	\$338	\$338	\$338	\$338	\$6,533
Contingency	\$1,786	\$1,351	\$1,638	\$1,638	\$1,638	\$1,638	\$1,638	\$1,638	\$1,638	\$2,908	\$2,908	\$9,827	\$9,827	\$9,827	\$9,827	\$9,827	\$1,965	\$459	\$1,965	\$1,965	\$1,965	\$1,965	\$1,965	\$23,471
Bond	\$1,624	\$1,228	\$1,489	\$1,489	\$1,489	\$1,489	\$1,489	\$1,489	\$1,489	\$2,643	\$2,643	\$8,834	\$8,934	\$8,934	\$8,934	\$8,834	\$1,787	\$417	\$1,787	\$1,787	\$1,787	\$1,787	\$1,787	\$21,337
OH & P	\$1,608	\$1,218	\$1,474	\$1,474	\$1,474	\$1,474	\$1,474	\$1,474	\$1,474	\$2,617	\$2,617	\$8,845	\$8,845	\$8,845	\$8,845	\$8,845	\$1,789	\$413	\$1,789	\$1,769	\$1,769	\$1,769	\$1,769	\$21,126
Sales Tax	\$1,237	\$935	\$1,134	\$1,134	\$1,134	\$1,134	\$1,134	\$1,134	\$1,134	\$2,013	\$2,013	\$6,804	\$6,804	\$6,804	\$6,804	\$6,804	\$1,361	\$318	\$1,361	\$1,361	\$1,361	\$1,361	\$1,361	\$16,251
Total	\$1,145	\$866	\$1,050	\$1,050	\$1,050	\$1,050	\$1,050	\$1,050	\$1,050	\$1,864	\$1,864	\$6,300	\$6,300	\$6,300	\$6,300	\$6,300	\$1,260	\$294	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$15,047
O&M/YR	\$	ç	S	<u>\$</u>	O \$	3	0\$	0\$	8	Q	8	2	2	2	2	2	8	೩	S	S	æ	æ	೩	æ
Construction Cost	\$1,145	\$866	\$1,050	\$1,050	\$1,050	\$1,050	\$1,050	\$1,060	\$1,060	\$1,864	\$1,864	\$6,300	\$6,300	\$6,300	\$6,300	\$6,300	\$1,260	\$294	\$1,260	\$1,260	\$1,260	\$1,260	\$1,260	\$15,047
Building	120	127	161	162	163	2	165	166	167	171	178	206	207	208	229	230	240	241	243	244	246	247	286	285

ECO21 A-5 COST SAVINGS

Construction Cost....Installed Cost

O&M/YR......Yearly maintenance scheduled as 2.5% of installed cost

Sales Tax.....8% of total

OH & P......Contractors overhead and profit 30% Bond

Bond....1%

Contingency......Estimators contingency 10%

70.3

Life Cycle Cost Analysis Summary ECO A-5 Energy Conservation Investment Program (ECIP) Sheet 13 of 13

Location:	Fort Hunter Lig Install Solar Film		Region No. 4		Project No. 16-403-10 Fiscal Year FY96
-	ion Name: ECO#				
	e: March 1993		Economic Life:	5 YEARS	Preparer: KELLER & GANNO
1. Investmen	t Costs	–			
A. Construct	ion Costs		\$105,275		
B. SIOH			\$5,790		•
C. Design Co	ost		\$6,317	•	
D. Total Cos	t (1A+1B+1C)		\$117,382		
E. Salvage V	alue of Existing E	quipment			-
	ity Company Reb			 	
G. Total Inve	stment (1D-1E-1F	7)			\$117,382
2. Energy Sa	wings (+)/Cost(-):	:			
Date of NIST	IR 85-3273-X Use	d for Discount Facto	ors		
Energy	Cost	Saving	Annuai \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
A. Elec.	\$21.84	355.0	\$ 7. 7 53	4.49	\$34,812
B. Dist	\$4.98		- \$0 ±	4.77	\$0 #
C. Propane	\$7.87		\$0 ~	4.79	\$0 🏻
D. Other			-		
E. Demand S	Savings				
F. Total	J		\$7,753		\$34,812
3. Non Energ	gy Savings (+) or	Cost (-):			
A. Annual Re	ocurring (+/-)		\$0 £		
	Factor (Table A)			4.45	
	ed Savings/Cost ((3A x 3A1)			\$0 <i>2</i> 2
B. Non Recu	rring Savings (+)	or Cost (-)			
Item	Savings(+)	Year of	Discount	Doscounted Sav-	
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4)	
a.			 -		••
b.					• •
C.					•
d. Total					
C Total Non	Energy Discounte	ed Savings (3A2+3E	3d4)	\$0 =	
		3A+(3Bd1/E∞nomi	c Life)):	15.1	Years
	Discounted Savin			\$34,812	
	Investment Ratio			0.30	
7. Adjusted I	nternal Rate of Re	eturn (AIRR):		-28.30%	

Keller & Gannon
Engineers-Architects

COMPUTED BY BIH	ECO A6	PROJECT 16-403-70
DATE	REDUCE GLASS AR	
REV 19		

DESCRIPTION OF ACTION

Reducing building wall glass area.

Improves the overall wall thermal

characteristics. Heating and cooling

energy use are reduced because

walls replacing window areas will

have a U value of about 0.06

while the glass being replaced has

a U value of about 0.75 to 1.1.

Solar gain is also reduced, saving

additional energy during the cooling

souson.

BUILDINGS INCLUDED

No buildings at FHL are seen to have excessive glass areas, thus, this Eco is not evaluated.

Σ	Keller	&	Gannon

Engineers-Architects

COMPUTED BY BIH	Edo A7	PROJECT 16-403-10 FITUE ENTP
DATE MATCH 1913	Install Shading	THEFTEN
REV19	Devices	SHEET NO OF SHEETS

Description of AcTION

Shading devices installed to keep windows, doors and for wall sections in shade during summer day-times will reduce the amount of solar heat gain, and, thus, the amount of energy reeded to provide space cooling.

BUILDINGS INCLUDED

The following buildings were identified during field investigations:

120 fire Station I dormatory

127 Book

161-167 Admin Buildings

177 Tech. Library

178 Child Development Conter

240,235,236,237,243,244,246,247,286 Admin Bidgs.

241 GM Facility.

ENERGY SAUINGS

Energy Savings for shading these boildings are based on TRACE-600 rons of a typical structure and then factored to each of the above buildings hasal-on-window areas in conditioned speeces:

FORM 101-1/8

Keller & Gannon

Engineers-Architects

CHECKE BY BITH DATE MARCH 193 HASTRUCENTAIN DEVICES REV 193 TEACH (200 AMARTS S) SHEET NO OF SHEETS THE FOLIOUTHAN BUILDING LIANS MARTING FOR A TREATMENT FOR THE GOO ANTALY SIS SOCIETY OF SHEETS THE FOLIOUTHAN BUILDING FOR SHEETS ATTICL THE FOLIOUTHAN BUILDING FOR SHEETS THE FOLIOUTHAN BUILDING STATE ATTICL THE FOLIOUTHAN BUILDING STATE TO SOFT SHEETS THE FOLIOUTHAN BUILDING STATE TO SOFT SHEETS THE FOLIOUTHAN BUILDING STATE TO SOFT SHEETS THE STATE OLD STATE THE FOLIOUTHAN BUILDING STATE THE SPACE OF ONE OF SHEETS THE FOLIOUTHAN BUILDING STATE TO STATE OF SHEETS THE FOLIOUTHAN BUILDING STATE THE FOLIOUTHAN BUILDING STAT	COMPUTED BY PUB	- Eco#	47	PROJECT 100-C	
THE FOLLOWING BUILDING WAS MODERNO FOR A TREPERSONATIVE TRANS GOOD ANALY SIS SOFT ATTIC SHETT NO DE SHEETS ATTIC TO SHETTS TO SHETTS TO SHEET NO DE SHEETS TO SHEETS T	CHECKED BY BIH			Fr. FA	<u> </u>
THE FOLLOWING BUILDING LASS MODERAD FOR A DEPRESENTATIVE TEACH 600 ANTALY SIS SOFT LIGHTIM LOTO 5 1/2 10 F REOPLE 2015 10 F REOPLE 20		1		SHEET NO	<u></u>
A TREPRESENTATIVE TRAVE 600 ANTALY SIS SOFT SOFT SOFT SOFT SUBMITION FRONT ON SOFT PROPE ATTIC LIGHTIM CARD. 5 YAT PROPLE 00 FT/PASH IN OUT SIDE AIR OLUS INTER LIGHTIM CARD. 5 YAT PROPE LIGHTIM CARD. 10 FT/PASH LIGHTIM CARD. 10 FT	REV19	PARECO	00 AHAU 1515	SHEET NO.	OFSHEETS
A TREPRESENTATIVE TRAVE 600 ANTALY SIS SOFT SOFT SOFT SUBMITTION STATIC SUBMITTION SOFT SUBMITTION SOFT					
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ROP HALL: 2015 10 FT/PRSN 2015 2016 2	MUTUATION /				
ROP HALL: 2015 10 FT/PRSN 2015 2016 2		<u> </u>			
ROOF GLASS DEET = 10% HALL ZONE ZONE 2					/
ROOF GLASS TREET = 10% HALL ZONE ZONE 2					
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# 10 WSULATION WITH IH SULATION EL BUILD WOOD HALL ISUARD 0:93 WITSIDE ARE 0.25 0:25 RIGHD IHSULATION ETG IHSULATION 19 GIP BOATED 0:56- THE SPACE 0.61 0.61 WSUDE ATR 0:08 EUSPRINCID CLUM 2.38 2.38	9:			20PT	
## 2.38 2.38 Cold Side Hill Cold Side Cold Side Hill Cold Side Cold Side Hill Cold Side Cold Side Hill Cold Side Cold Side Hill Cold Side Cold	•	-	WACE:		2-
## 2.38 2.38 Cold Side Hill Cold Side Cold Side Hill Cold Side Cold Side Hill Cold Side Cold Side Hill Cold Side Cold Side Hill Cold Side Cold	HOWSULFTON WITH IT	ISULATION :			
WISIDE AR 0.25 0.65 RIGID HSCILLTION 4- WILLTUP RODE 0.33 0.33 GAP BOATED 0.56- E-19 HSCILLTION 19 HSCIDE ATE 0.66- THE SPACE 0.61 0.61 HSCIDE ATE 0.68- EUSPEIDED CLUM 2.38 2.38 6.42- ESIDE AIR 0.61 0.61 UP 1/12 = 0.76 73.78 9.78					0.25.
21311/2 AIR 0.61 0.61 UP 1/12 = 0.76 23.78 4.18			_ WOOD WHILL ISUM	20	0.93
21.18 4.18 2.38 0.33 0.33 0.33 0.33 0.35 0.36 0.36 0.36 0.36 0.36 0.36 0.36 0.36	HISTOR OZS				
THE SUITE OF O COS THE COST OF THE SUITE AND OF COST O	MINTUP ROOF 0.3	30:32			,
THE SPACE 061 061 HOLDE THR 0:08 - 0:	FIG IHSULATION 19				
215 PEI DEIS CLUM 2.38 2.38 6.42 - 6.42 - 6.61 0.61 0.61 0.61 0.7 1/12 = 0.76			HSLOE AIR		クマングニー
3.18 9.18 23.18	:			· · · · · · · · · · · · · · · · · · ·	
23.18 4.18	eispenders com 2.3	3 2.38			6.HZ-
23.18 4.18	KIDE MO. O.	0.41	1131/2=01	6	
	23.1	8 4-18-		***************************************	
4 0.04 0.24					
	— <u> </u>	9-1-0.29			

ECO# A-4 ECO# A-3 ECO# A-5

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Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

PACKAGED TERMINAL AIR COND. DTAC System Peak ******** HEATING COIL PEAK ******** HEATING COIL PEAK ******** ****** COOLING COIL PEAK ****** Mo/Hr: 13/ 1 Mo/Hr: 7/17 Mo/Hr: 7/17 Peaked at Time ==> OADE: 96 DADE: 27 QADB/WB/HR: 96/ 70/ 70.0 Outside Air ==> Percnt * Net Percnt * Space Space Peak Coil Peak Percnt Ret. Air Ret. Air Space Of Tot * Space Sens Tot Sens Of Tot Total Of Tot * Sensible Sensible Latent Sens.+Lat. (%) * (Btuh) (Btuh) (%) 7 (Btuh) (%) * (Btuh) (Btuh) (Btuh) (Btuh) Envelope Loads 0.00 * 0 ٥ 0.00 0.00 * 0 0 0 0 Skylite Solr 0.00 * 0 0.00 * 0 0 0.00 0 0 0 Skylite Cond 5.97 * 0.00 * 10.08 0 0 -1,499 1,944 1,944 0 Roof Cond 46.44 * 0 0 0.00 12,250 12,250 37.63 * 0 Glass Solar 12,250 4.87 * -5.253 -5.253 35.35 3.94 * 1,283 1,283 0 Glass Cond 1,283 32.87 * -6,429 8,671 -8,107 54.56 11,066 34.00 * Wall Cond 8,671 2,395 0.00 * 0 0.00 * 0 0 0 0.00 0 Partition 0.00 ٥ 0.00 * ۵ 0.00 * 0 0 Exposed Floor 0.00 * 0 0 0.00 n 0.00 * 0 Infiltration 0 84.17 * 26,544 81.55 * -11,682 -14,859 100.00 22.205 4,340 Sub Total==> 22,205 Internal Loads 5.24 * 6.47 * 0 0.00 1,707 1.707 1,707 Lights 6.82 * 1,800 0 0.00 13.21 * 4,300 People 4,300 0.00 * 0 0.00 0.00 * 0 0 0 0 Misc 18.45 * 13.29 * 0 0.00 3,506 6,007 6,007 0 Sub Total==> 2.53 * 0.00 -516 668 0 0.00 * -582 582 Ceiling Load 0.00 * 0.00 ٥ 0 0.00 * n 0 Outside Air 0.00 * 0.00 -0.00 * Sup. fan Heat 0.00 * 0.00 0.00 * Ret. Fan Heat 0 0.00 * 0.00 0.00 * Duct Heat Pkup ٥ 0.00 * 0.00 ٥ 0.00 * OV/UNDR Sizing 0 0.00 * 0.00 0.00 * Ω Exhaust Heat 0.00 * 0.00 0.00 * 0 Terminal Bypass -14,859 100.00 100.00 * -12,198 32,551 100.00 * 26,379 3,757 Grand Total ==> 28,793 -----AREAS-----Gross Total Glass (sf) (%) " Leaving DB/WB/HR Total Capacity Sens Cap. _ Coil Airfl Entering DS/WB/HR 1,000 Deg f Deg F Grains Deg f Deg f Grains Floor (cfm) (Mbh) (Mbh) (Tons) 0 . 59.8 56.3 64.2 Part -1,602 76.9 63.1 66.9 32.6 30.1 Main Clg 2.7 0 -0 . 0.0 . 0.0 . 0.0 .. 0.0 ... 0.0 0.0 ExFlr Aux Clg 0.0 0.0 0.0 1,000 ~ Roof 0 3 0 0.0 0.0 0.0 . 0.0 0.0 Opt Vent 0.0 0.0 0.0 ٥ Walt 1,400 --140 - 10 2.7 32.6 Totals -- TEMPERATURES (F)----- ENGINEERING CHECKS-------AIRFLOWS (cfm)----------HEATING COIL SELECTION-----Type - Cooling Heating Clg % CA 0.0 Type 🖚 Cig 🚅 Htg 🖘 Capacity Coil Airfl Ent LVg * 0 🕾 0 🛎 Clg Cfm/Sqft 1.60 = SADB# 59.8 = 75.0 (cfm) Deg F Deg F Vent. (Hbh) 0 = 0 " Clg Cfm/Ton 590.46 Plenum = 76.8 64.5 Infil -18.3 1,602 64.5 75.0 Main Htg 1,602 Clg Sqft/Ton 368.66 Return 76.9 64.8 1,602 -Supply 0.0 0.0 Aux Ntg 0.0 0 - Clg Btuh/Saft 32.55 Ret/OA = 76.9 64.8 Minefm -0 🕏 1.602 _ 64.8 59.8 -0.0 Preheat 1,602 10 * Runarnd = 75.0 . 68.0 No. People 0.0 ___ Return 1,602 -0 0.0 0.0 Reheat Fn MtrTD = 0.0 - 0.0 . 0 0.0 a Hta X CA 0 . 0.0 0.0 . Exhaust 0.0 Humidif 1.60 Fn BldTD 0.0 0.0 ~ Htg Cfm/SqFt 0 0 0 0.0 0.0 Rm Exh 0.0 Opt Vent Htg Stuh/SqFt -18.31 Fn Friet 0.0 0.0 0 0 Auxil Total -18.3

ELO# A-9 ELO# A-5 ELO# A-5 ELO# A-7

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Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

						,,,,								
System	1	Peak	PTAC	- PACKAGE	D TERMINAL	AIR COND	•							
*****	******	****** C	OOLING COIL	PEAK ****	****	*****	***	**** CLG	SPACE	PEAK ****	****** HEA	TING COIL	PEAK 1	*****
Peaked a	at Time =			7/17			*		/Hr: 7	7/17	*	Mo/Hr:	13/ 1	
Outside	Air ==>	OA:	-	96/ 70/ 70.	0		*	a	ADB: 9	76	*	OADB:	27	•
							*				*			
		Space	Ret. Air	Ret. Air	Net	Percnt	*	S	pace	Percnt	* Space Pe	ak Coil	Peak	Percnt
		Sens.+Lat.	Sensible	Latent	Total	Of Tot	*	Sens	ible	Of Tot	* Space Se	ns Tot	Sens	Of Tot
Envelope	Loads	(Btuh)	(Btuh)	(Btuh)	(Btuh)	(%)	*	(B	tuh)	(%)	* (Btu	h) (I	Btuh)	(%)
Skylit	te Solr	0	0		0	0.00	*		0	0.00	*	0	0	0.00
Skylit	te Cond	0	0		0	0.00	*		0	0.00	*	0	0	0.00
Roof C	Cond	0	2,608		2,608	9.41	*		0	0.00	*	0 -	1,494	9.40
Glass	Solar	4,970	0		4,970		*	5	,600	26.45	*	0	0	0.00
Glass	Cond	2,421	0		2,421		*	2	,002	9.45	* -6,2	91 -	6,291	39.60
Wall C		9,228	2,495		11,723		*	9	, 149	43.22	* -6,4	.29 -	8,102	51.00
Partit		0	_,,,,_		0		*		0	0.00	*	0	0	0.00
	d Floor	0			0		*		0	0.00	*	0	0	0.00
	ration	0			0		*		0	0.00	*	0	0	0.00
	tal==>	16,618	5,103		21,722		•	16	,751	79.12	* -12,7	20 -1!	5,887	100.00
Internal		10,010	٥,٠٠٥		,		*	,-	•		*		,	
Lights		1,707	0		1,707	6.15	*	1	,707	8.06	•	0	0	0.00
People		4,300	•		4,300		*		,800	8.50	•	0	0	0.90
Misc		0	0	0	0		•		0	0.00	•	0	0	0.00
Sub To	tal==>	6,007	0	0	6,007	21.66	*	3	,506	16.56	•	0	0	0.00
Ceiling	Load	998	-998		0		*		913	4.31	• -6	35	0	0.00
Outside	Air	0	0	0	0	0.00	*		0	0.00	•	0	0	0.00
Sup. Fan	Heat				0	0.00	*			0.00	•		0	0.00
Ret. Fan	Heat		0		0	0.00	*			0.00	•		0	0.00
Duct Hea	it Pkup		0		0	0.00	*			0.00	•		0	0.00
OV/UNDR	Sizing	0			0	0.00	*		0	0.00	•	0	0	0.00
Exhaust	Heat		0	0	0	0.00	*			0.00	•		0	0.00
Terminal	Bypass		0	0	0	0.00	*			0.00	•		0	0.00
							*			1	•			
Grand To	ta(==>	23,622	4,106	0	27 ,728	100.00	*	21,	,170	100.00	-13,3	55 - 15	,887	100.00
				ING COIL SE	=: =CT10N							AREAS-		
	Total	Capacity		Coil Airfl		ng DB/WB/	'HR	Leav	ving DB	/UB/HR	Gross Tot		usa (sf	(%)
	(Tons)	(Mbh)	(Mbh)	(cfm)		g F Grai		Deg F	_	Grains	Floor	1,000		• •••
Main Clg	2.3	27.7	25.2	1,230		-		59.1	56.0	64.0	Part	0		
Aux Clg	0.0	0.0	0.0	0			0.0	0.0	0.0	. 0.0	ExFlr	0		
Opt Vent	0.0	0.0	. 0.0	ō			1.0	. 0.0	0.0	0.0	Roof	1,000		0 = 0
Totals	2.3	27 .7	. 0.0	•	0.0						Wall	1,400	1	40 ≠ ·10 ··
							<i>-</i>		-	NOTHER 1 W	CHECKS	TEMPER	ATIMES	
			CTION		AIF			Heating	_	X OA X OA	0.0 -			(r) ~ Htg™.
	Capacit	-		Lvg =	Type	Cooling		-			1.23	SADB	_	78.8
Main Her	(Mbh)	-		Deg F	Vent	•		0	•	Cfm/Sqft Cfm/Ton	532.33	Plenum	78.1	
Main Htg	-18.	•	230 64.3	78.0	Infit	1 370		1,230	-				78.1	
Aux Htg	0.		0.0		Supply	1,230		1,230	_	Sqft/Ton Stuh/Sqft		Return Ret/OA		64.7 64.7
Preheat	-0.	•	230 64.7		Mincfm Return	_	-	-	_		10		75.0	
Reheat	0.		0.0	0.0	Return	1,230		1,230		People % OA	0.0	Runernd Fn MtrTD		
Humidif	0.		0.0	0.0	Exhaust	0		0	_	% OA Cfm/SqFt	1.23			
Opt Vent	0.		0 0.0	0.0	Rm Exh	0		0	_			Fn BldTD		
Total	-18.	.3			Auxi L	0		0	Htg	Btuh/SqF1	-18 .3 2	fn Frict	0.0	0.0

Keller & Gannon

	COMPUTATION SHEET	Engineers-Architects
00115	P.B. I - I A.D.	PROJECT 16-403-10
	JTED BY THE FCO A-7	FIL FEAT?
	MARCH 1973 HOTTLE STONG FUILES	
REV		SHEET NO OF _ 1 _ SHEETS
□ L V	TOTAL CIRCUTTINOS	
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	ECOTA-7 27723 BR	44 4,892 BM+/1000 9
		= 4.892 BTUH/SF
		(10 10 10 10 10 10 10 10 10 10 10 10 10 1
		· · · · · · · · · · · · · · · · · · ·
	ASSUME SER = 10	
-	111 1 (000)	- 410 114-
	ALATS = 4.892/10	- , 9 1 10m / <=
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Electric Kwh/Yr						,			
	Propane	Fuel Oil	Electric	Propane	Fuel Oil	Electric	Propane	Fuel Oil	
4	MBTU/Yr	MBTU/Yr	Kwh/Yr	MBTU/Yr	MBTU/Yr	\$/YR	\$/YR	\$/YR	Total
_		-							
Н			3,252	0.0	0.0	\$242	0\$	\$0	\$242
						+			
			802	0.0	0.0	09\$	0\$	\$0	09\$
2,542			567	0.0	0.0	\$42	\$0	\$0	\$42
2,542			567	0.0	0.0	\$42	\$0	\$0	\$42
2,542			587	0.0	0.0	\$42	O\$	O\$	\$45
2,542			567	0.0	0.0	\$42	eş.	\$0	\$45
			567	0.0	0.0	\$42	\$0	\$0	\$42
			287	0.0	0.0	\$42	0\$	\$0	\$42
			567	0.0	0.0	\$42	0\$	\$0	\$42
8,742			906	0.0	0.0	89\$	\$0	0\$	\$68
9,652			1,173	0.0	0.0	\$87	0\$	\$0	\$87
17,032			758	0'0	0.0	\$56	0\$	\$0	\$56
157,060			2,519	0.0	0.0	\$188	0\$	0\$	\$188
17,032			756	0.0	0.0	\$56	0 \$	\$0	\$56
17,032			758	0.0	0.0	95\$	\$0	0\$	\$56
17,032			756	0.0	0.0	\$56	0\$	\$0	\$56
17,032			758	0.0	0.0	\$56	0\$	\$0	\$56
17,032			756	0.0	0.0	\$56	0\$	\$0	\$56
			17,153	0	0	\$1,279	0	0	
		·	_	: : !					. -

SHEET TORIS ELO A-T

		Total	\$221		25	\$437	\$214			\$286	\$286	\$286	\$286	\$286	\$286	\$286														\$838		
	=	\$/YR	2		8	æ	S.			8	2	0.	0.	S	9	8														\$138		
Savings	Propane	\$/YR	\$158		\$294	\$307	\$157			\$187	2018	\$194	\$184	\$184	\$194	\$104						-								Ç,		
	Electric	\$/VR	883		\$116	\$130	\$28			\$85	\$92	\$85	\$85	\$95	\$92	\$														\$503		
	Fuel Oil	MBTU/Yr	0.0		0.0	0.0	0.0			0.0	8	0.0	0.0	0.0	0.0	0.0														87.6		
Savings	Propane	MBTU/Yr	20.1		37.4	39.0	19.9			24.7	24.7	24.7	24.7	24.7	24.7	24.7														0.0		
	Electric	Kwh/Yr	846		1,554	1,747	775			1,234	1,234	1,234	1,234	1,234	1,234	1,234														6,745		
	Fuel Oil	MBTU/Yr	•		•	•	•			•	•	•	•			•														831.4		
W/ECO-A4	Properse	MBTU/Yr	23.9		145.8	154.1	17.4			46.3	46.3	46.3	46.3	46.3	46.3	46.3														•		
Energy Use W/ECO-A4	Electric	Kwh/Yr	4,972		11,148	1,036	4,490			2,638	2,636	2,636	2,638	2,638	2,638	2,638														20,340		
	Fuel Oil	MBTU/Yr																	3944.7	1375	1375	1375	1375							919		
Use W/Previous ECU's	Propane	MBTU/Yr	7	768.5	183.2	193.1	37.3	52.5		71	14	۶	۶	F	2	71	6.1	63.8						36.2	163	38.2	38.2	38.2	38.2		38.2	1040
Energy Use	Electric		5,618	15,216	12,702	2,783	5,265	418	823	3,872	3,872	3,872	3,872	3,872	3,672	3,872	10,869	12,405	108,696	268,495		286,764	276,379	18,805	162,971	18,805	18,805	18,805	18,805	27,085	18,805	629,841
Heating	-		86.0%	80.98	65.0%	20.0%	61.0%	80.79	¥	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	72.0%	66.4%	65.0%	70.8%	71.4%	72.1%	%6'12	71.2%	80.78	66.6%	80.79	% 0′ 29	67.0%	% 0'29	73.0%	67.0%	58.7%
Cooling	Deg	Fore	21,833	21,833	21,633	21.833	21,633	21,833	800'e	15,420	15,420	15.420	15,420	15,420	15.420	15,420	15,420	19,953	21,833	21,833	21,833	21,833	21,833	15,420	15,420	15,420	15,420	15,420	15,420	15,420	15,420	21,833
Heating	Degree	Hoch	93,192	85,120	93,192	85,120	93,192	93,192	11,702	60,531	60,531	60.531	60.531	60,531	60.531	60,531	60,531	74,412	116,562	85,120	85,120	65,120	85,120	60,531	60,531	60,531	60,531	60,531	60,531	39,883	60,531	65,120
201	GS	ì	1,090	9.120	2.001	2 250	866	7,172	2,025	2,250	2.250	2 250	2.250	2.250	2.250	2.250	3,580	3,599	16,768	27,238	26,999	26,692	36,063	3,000	10,000	3,000	3,000	3,000	3,000	12,289	3,000	41,002
Bida	•		•	120	124	127	131	=	200	100	162	28	2	5	8	167	111	22	208	207	208	220	230	240	241	243	244	246	247	252	286	295

		otal		\$327		ž		Γ		753	\$57	183	153	153	\$57	\$57	\$ 73	\$118	009	25.03	2987	958	\$1,291	2,5	8	ž	2	2	2		\$ 78	\$1,468	
	Fuel Oil	S/YR To		æ	_	8	<u> </u>	-		l s	2	8	g.	2	L	L	8	8	H	8	H	8	2	2	2		2	2	2		8	_	8
	_	_		L	_	_	_	L				H	H		L	\vdash	L	L	L	_	L	H	L	H		L	L	L			H	L	H
	Propane	\$/YR	L	8		8		L	L	8	8	8	8	8	8	8	8	8	2	3	3	8	8	0\$	Q	8	2	2	8		8	8	Ц
Savings	Electric	8 ∕⁄R		\$327		ž				753	153	183	153	153	\$57	\$57	8	\$118	008	\$10\$	196\$	998	\$1,291	9/3	234	878	876	878	878		878	\$1,468	87,772
	Fuel Oil	MBTU/Yr		•		۰				ŀ	٥	۰	•			.	.	•	0	0	٥		٥	0	0	0	0	0	0		۰	•	0
	Propane	MBTJ/Yr		۰		٥			Ī	•	0	٥	٥	•	٥		•	•	0	•	•			0	0	٥	•		•		۰	•	0
Savings	Electric	Kwh/Yr		4,381		1.081		Ī	T	283	283	82	28	283	283	8	8	- 580	8,054	13,083	12,988	12,821	17,322	1,018	848	1,018	1,018	1,018	1,018		1,018	19,694	104,262
	Fuel Oil	MBTU/Yr								T			-																-				
W/ECO-AS	Propene	MBTU/Yr																															
Energy Use W/ECO-AS	Electric	Kwh/Yr		10,835		1,702				3,100	3,100	3,100	3,100	3,100	3,100	3,100	9,648	10,825	100,642	255,412	255,527	273,943	259,057	17,787	162,123	17,787	17,787	17,787	17,787		17,787	610,147	
		Total															\$27													\$732			
	Fuel Q	#/YR															0\$													\$436			\$430
	Propane F	8/YR				_											28													Q			88
Savinge	Electric Pro	8/YR															\$18													\$206			\$313
Sa	_	77.		_	L	_	L		-											_													H
	ne Fuel	Yr MBT			_	L		L	L								0													8			98
	_	MBTU/Yr					L	L	L								-													0			-
Savinge	Electric	Kwth/Yr															340													3,962			4,202
		MBTU/Yr															•													7			
W/ECO-A3	Propere	MBTUZ															909		1											-			
Energy Use W/ECO-A3	_	Kwh/Yr															10,629													16,378			
			0	130	124	127	131	144	156	161	162	8	2	591	8	167	\dashv	178	8	20	200	520	82	340	241	243	72	246	247	+	386	206	

FRED HOTE

											,	_	_																			7 `	
		Total		\$242		09\$				\$42	\$42	\$42	\$42	\$42	\$42	\$42	89\$	28\$						\$56	\$47	\$26	\$26	\$26	\$56		\$56		· ·
	Fuel Oil	\$/YR		\$0		\$0				\$0	\$0	\$0	\$0	\$0	\$0	\$0	0\$	\$0						0\$	0\$	0\$	0\$	\$0	0\$		0\$		0
	Propane	\$/YR		\$0		\$0				\$0	\$0	\$0	0\$	\$0	\$0	\$0	\$0	\$0						\$0	\$0	\$0	\$0	\$0	0\$		0\$		0
Savings	Electric	\$/YR		\$242		\$60				\$42	\$42	\$42	\$42	\$42	\$42	\$42	\$68	\$87						\$56	\$47	\$56	\$56	\$56	\$56		\$56	_	\$1,138
	Fuel Oil	MBTU/Yr		0.0		0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0		0.0		0
	Propane	MBTU/Yr		0.0		0.0				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0						0.0	0.0	0.0	0.0	0.0	0.0		0.0		0
Savings	Electric	Kwh/Yr		3,252		802				292	267	267	267	292	267	267	906	1,173						756	630	756	756	756	756		756		15,264
	Fuel Oil	MBTU/Yr																															
W/ECO-A7	Propane	MBTU/Yr																															
Energy Use	Electric	Kwh/Yr		7,583		006				2,542	2,542	2,542	2,542	2,542	2,542	2,542	8,742	9,652						17,032	161,493	17,032	17,032	17,032	17,032		17,032		
Bldg			9	120	124	127	131	144	156	161	162	163	164	165	166	167	177	178	206	207	208	229	230	240	241	243	244	246	247	252	286	295	-

ECO23 A-7 COST SAVINGS

CONSTRUCTION COST ES	TIMAT	ΓE		Pete Prepared February	1993	Sheet Of	13
Project EEAP Limited Energy Study				Project No.	Basis for		
Fort Hunter-Liggett, California					Code A	(no design comp	eted)
Keller & Gannon					ļ		
Drawing No.		Estimat	or		Checked	By	
ECO# A-7 (INSTALL SHADING DEVI			RJB			BIH	
Line Item	No.	antity Unit	Per	Labor	Per	Aaterial	Total .
	Units	Meas.	Unit	Total	Unit	Total	Cost
BLDG120		ļ					
Indoor Blinds	218	SF	\$0.52	\$113	\$6	\$1,282	\$1,395
Total Bldg 120							\$1,395
BLDG 127							
Indoor Blinds	165	SF	\$0.52	\$86	\$6	\$970	\$1.0EC
Total Bldg 120	105	101	\$0.52	300	\$0	\$970	\$1,056
Total Bidg 120		 					\$1,056
BLDG 161-162		 					
Indoor Blinds	200	SF	\$0.52	\$104	\$6	\$1,176	\$1,280
Total Bldg 161-162		 - 	 	4.0.		41,170	\$1,280
							,
BLDG 177							
Indoor Blinds	355	SF	\$0.52	\$185	\$6	\$2,087	\$2,272
Total Bldg 355							\$2,272
BLDG 178		0=	44.55	4.00			
Indoor Blinds	355	SF	\$0.52	\$185	\$6	\$2,087	\$2,272
Total Bldg 178							\$2,272
BLDG 240							
Indoor Blinds	240	SF	\$0.52	\$125	\$6	\$1,411	\$1,536
Total Bldg 240	240	31	Ψ0.0 <u>Z</u>	Ψ123	- 40	Ψ1,-111	\$1,536
Total Bidg 240							Ψ1,550
BLDG 241							
Indoor Blinds	56	SF	\$0.52	\$29	\$6	\$329	\$358
Total Bldg 241							\$358
	1						

ECO24 A-7 COST SAVINGS

				Date Prepared		Sheet, Of	12
CONSTRUCTION COST EST	IMAT	Έ		February 1	993	11	'>
Project				Project No.	Basis for E	stimate	
EEAP Limited Energy Study							
Location Limited Energy Study				<u> </u>	Code A	(no design comp	eted)
Fort Hunter-Liggett, California Engineer-Architect							•
. Keller & Gannon Drawing No.		Estimat	or		Checked E	Зу	
ECO# A-7 (INSTALL SHADING DEVIC	ES)		RJB			BIH	ĺ
ESON TO THE STATE OF THE STATE	Qu	entity		Labor	Per	aterial	Total
Line Item	No. Units	Unit Meas.	Per Unit	Total	Unit	Total ·	Cost
BLDG 243							
Indoor Blinds	240	SF	\$0.52	\$125	\$6	\$1,411	\$1,536
Total Bldg 243							\$1,536
BLDG 244							
Indoor Blinds	240	SF	\$0.52	\$125	\$6	\$1,411	\$1,536
Total Bidg 244							\$1,536
BLDG 246							
Indoor Blinds	240	SF	\$0.52	\$125	\$6	\$1,411	\$1,536
Total Bidg 246							\$1,536
BLDG 247							
Indoor Blinds	240	SF	\$0.52	\$125	\$6	\$1,411	\$1,536
Total Bidg 247							\$1,536
	<u> </u>						
BLDG 286					- 40		
Indoor Blinds	240	SF	\$0.52	\$125	\$6	\$1,411	\$1,536
Total Bldg 286							\$1,536
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SHEET 120F 13 ELO * A-7

Building	Construction	O&M/YR	Total	Sales Tax	OH&P	Bond	Contingency	Savings	SIR
	\$1,395	2	\$1,395	\$1,507	\$1,959	\$1,978	\$2,176	\$1,076	0.5
	\$1,056	2	\$1,056	\$1,140	\$1,463	\$1,497	\$1,647	\$267	0.2
	\$1,280	2	\$1,280	\$1,382	\$1,797	\$1,815	\$1,997	\$186	0.1
	\$1,280	9	\$1,280	\$1,382	\$1,797	\$1,815	\$1,997	\$186	1.0
	\$1,280	9	\$1,280	\$1,382	\$1,707	\$1,615	\$1,997	\$186	0.1
	\$1,280	9	\$1,280	\$1,382	\$1,707	\$1,815	\$1,997	\$186	0.1
_	\$1,280	2	\$1,260	\$1,362	\$1,797	\$1,815	\$1,997	\$186	0.1
_	\$1,280	2	\$1,260	\$1,382	\$1,797	\$18,1\$	\$1,997	\$186	0.1
	\$1,280	2	\$1,280	\$1,382	\$1,797	\$1,815	\$1,997	\$186	0.1
_	\$2,272	8	\$2,272	\$2,454	\$3,190	\$3,222	\$3,544	\$303	0.1
	\$2,272	2	\$2,272	\$2,454	\$3,190	\$3,222	\$3,544	\$387	2.0
	\$1,536	Q \$	\$1,536	\$1,659	\$2,157	\$2,178	\$2,396	\$249	0.1
_	\$358	2	\$358	\$387	\$503	\$508	\$558	\$200	4.0
-	\$1,536	2	\$1,536	\$1,659	\$2,157	\$2,178	\$2,396	\$240	0.1
_	\$1,536	&	\$1,536	\$1,659	\$2,157	\$2,178	\$2,396	\$249	-9
-	\$1,536	2	\$1,536	\$1,659	\$2,157	\$2,178	\$2,396	\$249	0.1
_	\$1,536	8	\$1,536	\$1,659	\$2,157	\$2,178	\$2,396	\$249	0.1
_	\$1,536	2	\$1,536	\$1,659	\$2,157	\$2,178	\$2,396	\$240	0.1
ï									

Construction Cost....installed Cost

O&M/YR.....Yearly maintenance scheduled as 2.5% of installed cost

Savings......Yearly savings multiplied by UPW factor for 5 years (4.45)

Savings/(Coet+Maint*UPW) #8-5- 1 11-1

Life Cycle Cost Analysis Summary ECO A-7 Energy Conservation Investment Program (ECIP) Sheet 13 of 13

Location:	Fort Hunter Lig Install Shading D	=	Region No. 4		Project No. 16-403-10 Fiscal Year FY96
•	ion Name: ECO#				
_	e: March 1993		Economic Life:	5 YEARS	Preparer: KELLER & GANNON
1. Investmen	t Costs			_	
A. Construct	ion Costs		\$18,306	_	
B. SIOH			\$1,007	_	
C. Design Co	ost		\$1,098	•	
D. Total Cost	t (1A+1B+1C)		\$20,411	-	
E. Salvage V	alue of Existing E	quipment			_
F. Public Util	ity Company Reb	ate			
G. Total Inve	stment (1D-1E-1F	7)			\$20,411
2 Energy Sa	vings (+)/Cost(-)	<u>.</u>	÷		
Date of NIST	IR 85-3273-X Use	d for Discount Facto	ors .	-	
Energy	Cost	Saving	Annual \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
A. Elec.	\$21.84	17.0	\$371	4.49	\$1,667
B. Dist	\$4.98		\$ 0	4.77	\$0 .
C. Propane	\$7.87		- \$0	4.79	\$0
D. Other					
E. Demand S	Savings				•
F. Total			\$371		\$1,667
3. Non Energ	y Savings (+) or	Cost (-):		-	
A. Annuai Re	curring (+/-)		(\$286)	_	
(1) Discount	Factor (Table A)			4.45	
(2) Discounte	ed Savings/Cost ((3A x 3A1)			(\$1,273)
B. Non Recu	rring Savings (+)	or Cost (-)			
Itema	Savings(+)	Year of	Discount	Doscounted Sav-	
10014	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4)	
8			_		
b			_		
C					
d. Total					
C Total Non	Energy Discounte	ed Savings (3A2+3E	3d4)	(\$1,273)	
		BA+(3Bd1/Economi	c Life)):	239.3 \$3 94	Years
	Discounted Savin			0.02	
	Investment Ratio			-63.45%	
7. Adjusted I	nternal Rate of Re	etum (AIRR):		-03.45%	

KELLER & GANNON **Engineers & Architects**

Quality Services Since 1941

FAN

COMPUTED BY RIH	ECO # B-1	PROJECT 16-403-10
CHECKED BY	DUTY CYCLING	777
DATE	ADDENDOM	SHEET NO / OF _ 5 SHEETS

RESPONSE TO REVIEW COMMENT: FORSCOM EEAP REVIEW COMMENTS DATED 4/2/93, NARESH KAPUR, PE, FCEN-RDF, COMMENT NO. 12.

OTHER BUILDINGS WITHIN LIST OF SIGNIFICANT ENERGY USING BLOGS ARE CONSIDERED; BUILDINGS CONSIDERED:

101	HACIENDA -		CONTROL	ELEC. RES. HTR.S.
120	FIRE STATION .	_	CONTROL	EAST SIDE AND FA
161	ADMINU. BLDGS	_	CONTROL	AHU FANS
162		-		//
163	 ,,			-//
164	//	-		//
165				//
166	 11 	-		//
167	11	-		- //
177	TECH, LIBRARY			
178	CHILD. DEV. CIUTE	-		. #
182	COMMISSARY	-		· 11
190	CHAPEL	_		"
197	ADMIN BLOG RED	-		"
209	SNACK BAR	_		<i>u</i> —
210	CLINIC	_		<i>i</i> ¹
211	SWIMMING POOL	-	- CONTROL	CIRC PUMP(S)
212	GYMNASIUM			AHU FANS
235	ADMIN. BLDGS.	~	-	//
236	<i>"</i>	-		//
237	<i>II</i>	~		
338	//	-		//
240	11	_		<i>//</i>
341	SM FACILITY	-		//
243	ADMIN. BLDG.	-		//
244	//	-		+1
246	<i>[1</i>	-		<i>//</i>
- 119	4.1			//

KELLER & GANNON Engineers & Architects Quality Services Since 1941

COMPUTED BY BIH	- · · · · · · / · · · · · / · · · · · ·	PROJECT 16-403-10
CHECKED BY	_ECD# B-1	FHL EEAP
DATE JUNE 1993	DUTY CYCLING	
REV 19	ADDENDOM	SHEET NO. 2 OF 5 SHEETS

BUILDINGS CONSIDERED, CONTRUED:
252 VEHICLE MAINT, SHOP - COINTROL HW ILING PUMP
256 // //
259 // //
286 ADMIN. BLDG CONTROL HVAC FANS
287 REC. CENTER - "
288 GEN, PURP, WHSE
290 ELECTRONIC EQUIP. FAC 11
291 LONT. HUMID. WHS = - 11-
301 ADP 3016NG - 11-
DNLY THOSE MOTORS & OTHER ELECTRIC LOADS WHICH ARE CONTINUOUS OR ARE WEED DURING PEAK ELECTRICAL USE PERIODS ARE CONSIDERED
IN MOST CASES, LOADS INCLUDE ONLY THE
FAN FOR HUAC SUPPLY / RETURN AIR.
ET IS NOT PROPOSED TO CONTRUCE
COMPILESSORS ON THESE SIMPLE POOR TOP
TYPE UNITS. THE FOLLOWING TABLES
INDICATE ENERGY & COST SAUINGS,
BASIS ASSUMES LOADS TURINED OFF TOMIN
FUERN HOUR

SHEET 30F5

ECO B-1 (Duty Cycling) Cost Savings (Addendum June 1993)

SIR	(2)	4.66	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.53	0.14	0.11			0.13			0.43	0.36			1.07	0.80	0.05	0.11	0.11	0.11			1.92	0.11
Simple	Payback	2.51	107.91	107.91	107.91	107.91	107.91	107.91	107.91	107.91	22.10	80.93	107.91			92.49			26.98	32.37			10.96	14.55	215.82	107.91	107.91	107.91			60.9	107.91
Invest	છ	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619			\$2,619			\$2,619	\$2,619			\$2,619	\$2,619	\$2,619	\$2,619	\$2,619	\$2,619			\$2,619	\$2,619
Demand	\$LCC	\$12,215	\$284	\$284	\$284	\$284	\$284	\$284	\$284	\$284	\$1,386	\$379	\$284			\$331			\$1,136	\$946			\$2,795	\$2,106	\$142	\$284	\$284	\$284			\$5,031	\$284
Demand	\$/Yr	\$1,044	\$24	\$24	\$24	\$24	\$24	\$24	\$24	\$24	\$118	\$32	\$24	\$12	\$16	\$28	\$81	\$16	\$97	\$81	\$158	\$81	\$239	\$180	\$12	\$24	\$24	\$24	\$309	\$121	\$430	\$24
Demand	kW Saved	9.67	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	1.10	0.30	0.22	0.11	0.15	0.26	92'0	0.15	0.90	92'0	1.46	0.75	2.21	1.67	0.11	0.22	0.22	0.22	2.86	1.12	3.98	0.22
New	κ	48.3	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	5.5	1.5	1.1	9.0	0.7	Total	3.7	0.7	Total	3.7	7.3	3.7	Total	8.3	9.0	1.1	1.1		14.3	5.6	Total	1.1
Total	κ	58.0	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	9.9	1.8	1.3	0.7	6.0		4.5	6.0		4.5	8.8	4.5		10.0	0.7	1.3	1.3	 6.	17.1	2.9		1.3
₹		58.0	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	6.58	06.0	0.67	29.0	06.0		4.49	0.00		4.49	8.78	4.49		10.00	0.67	0.67	0.67	0.67	17.15	6.74		0.67
Mtr	Eff	100%	83%	83%	83%	83%	83%	83%	83%	83%	85%	83%	83%	83%	83%		83%	83%		83%	82%	83%		82.5%	83%	83%	83%	83%	87%	83%		83%
모		•	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	7.50	1.00	0.75	0.75	1.00		5.00	1.00		5.00	10.00	5.00		10.00	0.75	0.75	0.75	0.75	20.00	7.50		0.75
S S	Ea.	-	2	2	2	2	2	2	2	2	-	2	2	-	_		-	-		-	-	_		1	1	2	2	7	-	_		2
J Item to be	Controlled	1 Elec Res Heaters (1)	20 Fan Coil Unit SA Fan	31 Fan Coil Unit SA Fan	162 Fan Coil Unit SA Fan	163 Fan Coil Unit SA Fan	164 Fan Coil Unit SA Fan	165 Fan Coil Unit SA Fan	166 Fan Coil Unit SA Fan	┼	177 Fan Coil Unit SA Fan	178 Fan Coil Unit SA Fan	182 Fan Coil Unit SA Fan	190 Fan Coil Unit SA Fan	Fan Coil Unit RA Fan	-	197 Fan Coil Unit SA Fan	Fan Coil Unit RA Fan		209 Fan Coil Unit SA Fan	210 Fan Coil Unit SA Fan	Fan Coil Unit RA Fan		211 HW Circulation Pumps	212 Fan Coil Unit SA Fan	235 Fan Coil Unit SA Fan	-	237 Fan Coil Unit SA Fan	238 Fan Coil Unit SA Fan	Fan Coil Unit RA Fan		240 Fan Coil Unit SA Fan
Building		101	120	161	16	16	16	16	16	167	17	17	18	15			15			30	21			21	21	25	×	S	K			57

Building	Item to be	Š	H	Mtr	₹	Total	New	Demand	Demand	Demand	Invest	Simple	SIR
1	Controlled	Ea.		Eff		κW	κW	kW Saved	\$/Yr	\$LCC	₩	Payback	(2)
241	Fan Coil Unit SA Fan	-	2.00	83%	1.8	1.8	1.5	0:30	\$32				
	Fan Coil Unit RA Fan	-	1.00	83%	06.0	6.0	0.7	0.15	\$16				
							Total	0.45	\$49	\$568	\$2,619	53.95	0.22
243	Fan Coil Unit SA Fan	2	0.75	83%	0.67	1.3	1.1	0.22	\$24	\$284	\$2,619	107.91	0.11
244	Fan Coil Unit SA Fan	2	0.75	83%	0.67	1.3	1.1	0.22	\$24	\$284	\$2,619	107.91	0.11
246	Fan Coil Unit SA Fan	2	0.75	83%	0.67	1.3	1.1	0.22	\$24	\$284	\$2,619	107.91	0.11
247	Fan Coil Unit SA Fan	2	0.75	83%	0.67	1.3	1.1	0.22	\$24	\$284	\$2,619	107.91	0.11
252	252 HW Circulation Pumps	-	0.75	83%	29.0	0.7	9.0	0.11	\$12	\$142	\$2,619	215.82	0.05
256	HW Circulation Pumps	,-	0.75	83%	29.0	0.7	9.0	0.11	\$12	\$142	\$2,619	215.82	0.05
259	HW Circulation Pumps	-	0.75	83%	29.0	0.7	9.0	0.11	\$12	\$142	\$2,619	215.82	0.05
286	Fan Coil Unit SA Fan	7	0.75	83%	29.0	1.3	1.1	0.22	\$24	\$284	\$2,619	107.91	0.11
287	Fan Coil Unit SA Fan	-	5.00	85%	4.39	4.4	3.7	0.73	\$79				1- 2-
	Fan Coil Unit RA Fan	-	3.00	83%	2.70	2.7	2.2	0.45	\$49				
							Total	1.18	\$128	\$1,492	\$2,619	20.53	0.57
288	Fan Coil Unit SA Fan	2	0.75	83%	29.0	1.3	1.1	0.22	\$24	\$284	\$2,619	107.91	0.11
290	Fan Coil Unit SA Fan	2	,	•	1.33	2.7	2.2	0.44	\$48	\$295	\$2,619	54.53	0.21
291	Fan Coil Unit SA Fan	7	•		4.78	9.6	8.0	1.59	\$172	\$2,014	\$2,619	15.22	0.77
301	Fan Coil Unit SA Fan	-	15.00	82%	13.16	13.2	11.0	2.19	\$237				
	Fan Coil Unit RA Fan	—	3.00	83%	2.70	2.7	2.2	0.45	\$49				
							Total	2.64	\$285	\$3,340	\$2,619	9.17	1.28
Summary	Summary of 'Added' Building Analysis Factors	ysis f	-actors										
101	Elec Res Heaters (1)	-	•	100%	58.0	58.0	48.3	29.6	\$1,044	\$12,215	\$2,619	2.51	4.66
210	HVAC Unit SA & RA Fa						Total	2.21	\$239	\$2,795	\$2,619	10.96	1.07
238	HVAC Unit SA & RA Fa						Total	3.98	\$430	\$5,031	\$2,619	60.9	1.92
301	HVAC Unit SA & RA Fa						Total	2.64	\$285	\$3,340	\$2,619	9.17	1.28
Total								18.50	\$1,998	\$23,381	\$10,475	5.24	2.23
NOTES:	1. Hacienda has 90 kW connected load of 3 kW electric resistance space heaters. Assume that 60% are left on during the day, and	con	nected I	oad of	3 kW ek	ectric re	sistance	space hea	aters. Ass	ume that 6	0% are left	on during t	ne day, and

Simple payback period and SIR calculations above do not include added O&M costs; refer to ECIP Analysis Sheet for complete assumes a 90% room occupancy rate. (The Hacienda is usually filled year-round.) Thus, load is $90 \times .60 \times .90 = 58 \text{ kW}$. તાં

4 OF 5

SHEET

File: F.IPBO.N1640310/FNIGRIFC. FCO-B1A WO1

Life Cycle Cost Analysis Summary ECO B-1 Energy Conservation Investment Program (ECIP) Sheet 5 of 5

•	Fort Hunter Ligge Duty Cycling ion Name: ECO# E		Region No. 4		Project No. 16-403-10 Fiscal Year FY96
	e: June 1993		Economic Life:	15 YEARS	Preparer: KELLER & GANNON
E. Salvage V	on Costs		\$23,710 \$1,304 \$1,423 \$26,437	\$250	
	stment (1D-1E-1F)	-			\$26,187
2. Energy Sa	vings (+)/Cost(-): R 85-3273-X Used	for Discount Factor	s		
Energy	Cost	Saving	Annual \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
A. Elec.	\$21.84		\$ 0	11.70	\$O
B. Dist	\$4.98		\$0	13.78	\$0
C. Propane	\$7.87		\$0	14.16	\$0
D. Other				11 70	
E. Demand @ F. Total	\$108/kW-Yr	130.8	\$14,122 \$14,122	11.70	\$165,227 \$165,227
3. Non Energ A. Annual Re (1) Discount f	y Savings (+) or Co curring (+/-) Factor (Table A) d Savings/Cost (3A		(\$667)	11.12	(\$7,413)
B. Non Recur	ring Savings (+) or	· Cost (-)			
ltem	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Doscounted ings(+)Cost	
a.					~~~~
b.			<u>.</u> -		
c. d. Total					
C Total Non E	Energy Discounted	Savings (3A2+3Bd	4)	(\$7,413)	
5. Total Net D 6. Savings to	back 1G/(2F3+3A- iscounted Savings Investment Ratio (S ternal Rate of Retu	(2F5+3C): SIR) 5/1G:	Life)):	\$1 57, 8 6	1.9 Years 814 6.03 80%

File: F:\PROJ\1640310\ENGR\ECO\LCC-B1A.WQ1

Keller & Gannon

Engineers-Architects

	753	19		HUE TO AN	SHEET NO	OF <u>/3</u> _ SH
REV.			PROJECT TRE	Carallet Sai		
-			-			
			HETTOH:			
· · · ·	AR CO	LET C	other thing	weet orks	for c	ナレレビア
-		71-17-1-1	STEM ALC	CHITS WILL	山乃臣	SHOPE
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Keiler & Gannon

Engineers-Architects

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FORM 101-1/8

Keller & Gannon

Engineers-Architects

COMPUTED BY 1213 CHECKED BY 1913 SIDNE CATIENTS FROM SUN REV. 19 FIRETRAY SAVINAS CALL. SHEET NO. 3 OF 13 SHEETS
- ASSUME AN AVERTURE AMBIET TEMPERATURE - OR SS"F. THUS IJITH A GT"F CLTD THE SURFITEE OF THE LIHIT IS RMSED TO A
TEMPERATURE OF 95+69=164°F ASSUME MA AVERTAGE OF 5 GEM/FTZ CF SUPERAGE MARK OF MR 15 HEIMTED TO 164°. 134 BTCH/FTZ - 26.8 BTUH/GFM
5 CFM /FT = 5 CFM x d, 45 + 0h = 26.8 - 6 BTU/16 = 4.45 4.45
FROM PSYCHROMETRIC CHART THE FROM PSYCHROMETRIC CHART THE FROM 85° F TO 96° F FROM MAN UFACTURERS CATALOG DATA
TOR AND COOLED CHILLERS AND ARE COULD TREPRICIENT CONDENSERS THE AVERTAGE EFFICIENT IS INCREASED BY 10% WITH A DECREENSE IN EXERCITE AVE TEMPSEATURE FROM 95" TO 85" F

ECO BZ shoet 4 of 13 SENSIBLE HEAT RATIO = Qs + Q 1-AVERNARE 2-DESIGNA CONTOUT 1245 AMBIEHT MIR DUE TO WOLAR GAIN PSYCHROMETRIC CHARTS * TIPITIFIECHT WE O 1960 IHE HANE COMPANY, IA CROSSE WISCONSIN Barometric Pressure 29921 Inches of Mercury GTH = Total cfm × 4.45 × Δh = Btu/hr KELLER & GANNON Consulting Engineers HEAT GAIN DATA Ent.Air_ 8 A

Performance Data

Table 16-1 — CGACD18E (180/200-Ton Evap) Performance Data

						Enterina	Condense	Air Temp	erature (C	egrees F)					<u> </u>
LWT		75			85			95			105			115	
(DEG F)	TONS	KW	EER	TONS	KW	EER	TONS	KW	EER	TONS	KW	EER	TONS	KW_	EER
40	169.6	148.0	11.8	160.3	157.4	10.6	150.4	166.2	9.5	140.0	174.6	8.4	129.0	182.6	7.5
42	175.2	150.2	12.0	165.6	160.0	10.8	155.5	169.2	9.6	144.8	177.8	8.6	133.5	186.4	7.6
44	180.9	152.6	12.3	171.0	162.4	11.0	160.6	172.0	9.8	149.6	181.2	8.7	138.0	190.2	7.7
45	183.8	153.6	12.4	173.8	163.8	11.1	163.2	173.4	9.9	152.0	183.0	8.8	140.3	192.2	7.8
46	186.7	154.8	12.5	176.5	165.0	11.2	165. B	174.8	10.0	154.5	184.6	8.9	142.6	194.1	7.8
48	192.5	157.0	12.7	182.0	167.4	11.4	171.0	177.8	10.1	159.4	188.0	9.0	147.3	198.4	7.9
50	198.3	159.2	13.0	187.6	170.0	11.6	176.3	180.8	10.3	164.4	191.6	9.1	152.0	202.6	8.0

Table 16-2 — CGACD20E (150-Ton Evap) Performance Data

						Entering	Condense	Air Temp	erature (D	egrees F)					
LWT		75			85			95			105			115	
(DEG F)	TONS	KW	EER	TONS	KW	EER	TONS	KW	EER	TONS	KW	EER	TONS	KW	EER
40	180.0	166.8	11.3	170.4	176.6	10.2	160.1	186.0	9.1	149.2	194.6	8.2	1 37.7	203.0	7.3
42	185.8	169.4	11.5	175.8	178.6	10.3	165.3	189.2	9.3	154.1	198.4	8.3	142.3	207.2	7.4
44	191.6	172.0	11.7	181.4	182.6	10.5	170.5	192.6	9.4	159.1	202.2	8.4	146.9	211.6	7.5
45	194.5	173.4	11.8	184.2	184.0	10.6	173.2	194.2	9.5	161. 6	204.0	8.5	149.3	213.8	7.5
46	197.4	174.6	11.9	187.0	185.4	10.7	175.8	195.8	9.6	164.1	206.0	8.6	151. 6	216.2	7.6
48	203.3	177.2	12.1	192.6	188.4	10.9	181.2	199.2	9.7	169.1	209.8	8.7	156.4	220.8	7.7
 0	209.3	179.8	12.3	198.2	191.4	11.2	186.5	202.6	9.9	174.2	213.8	8.8	161.2	225.4	7.8

Table 16-3 — CGACD20E (180/200-Ton Evap) Performance Data

														12.6 207.8 17.4 212.0 52.3 216.8 54.7 219.2 57.2 221.6	
	-					Entering	Condense	r Air Temp	erature (D	egrees F)					
LWT		75			85			95			105			115	
(DEG F)	TONS	KW	EER	TONS	KW	EER	TONS	KW	EER	TONS	KW	EER	TONS	KW	EER
40	188.1	170.4	11.6	177.7	180.6	10.4	166.6	190.0	9.3	154.9	199.0	8.3	142.6	207.6	7.4
42	194.2	173.2	11.8	183.4	183.6	10.6	172.1	193.7	9.5	160.0	203.0	8.4	147.4	212.0	7.5
44	1200.4	176.0	12.0	189.3	186.6	10.8	177.6	197.0	9.6	165.2	206.8	8.6	152.3	216.8	7.6
45	203.5	177.4	12.1	192.2	188.2	10.8	180.4	198.6	9.7	167. 9	209.0	8.6	154.7	219.2	7.6
46	206.6	178.6	12.2	195.2	189.8	10.9	183.1	200.4	9.8	170.5	211.0	8.7	157.2	221.6	7.7
48	212.8	181.4	12.4	201.1	192.8	11.1	188.8	204.0	9.9	175.8	215.2	8.8	162.2	226.4	7.8
50	219.1	184.2	12.6	207.1	195.8	11.3	194.4	207.6	10.1	181.2	219.4	8.9	167.3	231.6	7.8

Notes:

1. Retings based on sea level altitude and eveporator fouling factor of 0.0005 per ARI 590-81 or 0.00025 per ARI 590-86.

2. Interpolation between points is permissible.

3. Extrapolation between points is not permissible.

4. KW input is for compressors only.

5. EER = Energy Efficiency Ratio, (Studwest-hours, Power inputs include compressors, condenser fans and control power.

6. Rated in accordance with ARI Standard 590.

7. Ratings are based on an evaporator temperature drop of 10 degrees F.

Performance Data

Table 19-1 — CGAD-C40

						Entering	Condenser	Air Temp	erature (£	Degrees F)					
		75			85			95			105			115	
LWT (Deg F)	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER
40	36.7	31.6	12.3	34.9	35.0	10.7	33.0	39.0	9.2	31.0	43.4	7.8	28.9	48.2	6.6
42	37.9	32.0	12.6	36.0	35.4	11.0	34.1	39.4	9.4	32.0	43.8	8.1	29.9	48.6	6.8
44	39.1	32.2	12.9	37.2	35.8	11.2	35.2	39.6	9.7	33.1	44.0	8.3	31.0	49.0	7.0
45	39.7	32.4	13.1	37.8	35.8	11.4	35.8	39.8	9.8	33.7	44.2	8.4	31.5	49.2	7.1
46	40.4	32.6	13.2	38.4	36.0	11.5	36.4	40.0	9.9	34.3	44.4	8.5	32.0	49.4	7.2
48	41.6	32.8	13.5	39.6	36.4	11.8	37.5	40.4	10.1	35.4	44.8	8.7	33.1	49.8	7.4
50	42.9	33.2	13.8	40.9	36.8	12.0	38.7	40.8	10.4	36.5	45.2	8.9	34.2	50.4	7.6
55	46.2	34.0	14.6	44.0	37.6	12.7	41.8	41.8	11.0	39.5	46.4	9.4	37.1	51.4	8.0
60	49.6	34.8	15.3	47.3	38.4	13.3	45.0	42.6	11.5	42.5	47.4	9.9			

- Notes:
 1. Ratings based on a 0.0005 fouling factor at see level per ARI standard 590-81 or 0.00025 fouling factor at see level per ARI standard 590-86.
- Interpolation between points is permissible.
 Extrapolation beyond points is not permissible.

- K. W. input is for compressors only.
 EER = Energy Efficiency Ratio, (Btu/watt-hour). Power inputs include compressors, condenser fans and control power.
 Rated in accordance with ARI standard 590.
 Ratings are based on an evaporator temperature drop of 10 F.

Table 19-2 -- CGAD-C50

						Enterin	g Condenser	Air Temp	erature (E	Degrees F)					
		75			85			95			105			115	
LWT (Deg F)	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER
40	46.0	41.6	11.6	43.8	45.8	10.2	41.6	50.6	8.8	39.2	56.0	7.6	36.6	62.2	6.5
42	47.5	42.0	11.9	45.3	46.2	10.4	43.0	51.2	9.0	40.5	56.6	7.8	37.9	62. 6	6.6
44	49.1	42.4	12.2	46.8	46.8	10.7	44.4	51.6	9.3	41.8	57.0	8.0	39.2	63.2	6.8
45	49.8	42.6	12.3	47.5	47.0	10.8	45.1	51.8	9.4	42.5	57.4	8.1	39. 9	63.4	6.9
46	50.6	42.8	12.5	48.3	47.2	10.9	45.8	52.2	9.5	43.2	57.6	8.2	40.5	63.8	7.0
48	52.2	43.4	12.7	49.8	47.6	11.2	47.3	52.6	9.7	44.6	58.2	8.4	41.9	64.2	7.2
50	53.8	43.8	13.0	51.3	48.2	11.4	48.8	53.2	9.9	46.1	58.6	8.6	43.2	64.8	7.3
55	57.9	45.0	13.7	55.3	49.4	12.0	52.6	54.4	10.5	49.7	60.0	9.1	46.8	66.2	7.8
60	62.1	46.2	14.3	59.4	50.6	12.6	56.5	55.8	11.0	53.6	61.4	9.5			

- 1. Ratings based on a 0.0005 fouling factor at see level per ARI standard 560-81 or 0.00025 fouling factor at see level per ARI standard 560-85.

- 1. harrogs based on a ductor of a trees and a see since per And standard secret of ductors folling se

Table 19-3 — CGD-C60

						Entering	g Condenser	Air Temp	erature (C	Degrees F)					
		75			85			95			105			115	
LWT (Deg F)	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	input KW	EER	Capacity (Tons)	Input KW	EER
40	54.5	48.6	12.0	52.0	53.8	10.5	49.4	59.6	9.0	46.6	66.0	7.8	43.7	73.2	6.6
42	56.3	49.2	12.3	53.7	54.4	10.7	51.1	60.2	9.3	48.2	66.8 ·	8.0	45.2	73.8	6.8
44 -	58.1	49.6	12.6	55.5	55.0	11.0	52.7	60.8	9.5	49.8	67.4	8.2	46.7	74.4	7.0
45	59.0	49.8	12.7	56.4	55.2	11.1	53.8	61.2	9.6	· 50.6	67.6	8.3	47.5	74.8	7.1
46	59.9	50.2	12.8	57.3	55.4	11.2	54.4	61.4	9.7	51.4	68.0	8.4	48.3	75.2	7.2
48 -	61.8	50.6	13.1	59.1	56.0	11.4	56.2	62.0	9.9	53.1	68.6	8.6	49.9	75.8	7.3
50	63.7	51.2	13.4	60.9	56.6	11.7	57.9	62.6	10.1	54.8	69.2	8.8	51. 5	76.4	7.5
55	68.6	52.6	14.1	65.6	58.0	12.3	62.4	64.2	10.7	59.1	70.8 -	9.2	55.7	78.2	7.9
60	73.6	53.8	14.8	70.4	59.6	12.9	67.1	65.8	11.2	63.6	72.6	9.7			

- Notes: 1. Ratings based on a 0.0005 fouling factor at see level per ARI standard 590-81 or 0.00025 fouling factor at see level per ARI standard 590-85.

- Netroigs based on a LUUDO loaning tactor at see level per AH standard 560-51 or LUULZO follung factor at see level per /2. Interpolation beyond points is priminable.
 Extrapolation beyond points is not permissible.
 Key input is for compressors only.
 EER = Energy Efficiency Ratio, (Btu/watt-hour), Power inputs include compressors, condenser fains and control power.
 Rated in accordance with ARI standard 560.
 Rated in accordance with ARI standard 560.
 Ratings are based on an evaporator temperature drop of 10 F.

TABLE 16-1 — System Capacity Data — Air-Cooled Condenser with Compressor Chiller (cont.)

AIR-COOLED	LEAVI NG			AMBIENT			
CONDENSER COMPRESSOR	CHILLED WATER	85	5	95		105	5
CHILLER	TEMPERATURE (F)	TONS	кw	TONS	кw	TONS	кw
COMBINATION	40	73.2	749	66.6	79.1	62.3	83.0
CAUA 800	42	74 1	76.1	69.1	80.4	64.5	84 4
WITH	45	77.5	77.9	72.9	82.2	67.9	86.5
CCUA 080 R	48	81.4	79.4	76.5	84.0	71.4	88.7
000/1000 11	50	83.7	80.8	78.9	85.6	74 0	90.5
(2) CAUA	40	119.4	103.1	110.4	110.7	99.4	117.4
800	42	118.1	104.5	110.6	112.3	102.9	119.4
with	45	123.8	106.6	116.0	114.8	108.0	122.3
CCUA 120 R	48	129.3	108.7	121.4	117.1	113.2	125.0
CCOA 120 h	50	133.1	110.0	125.2	118.6	116.8	126.8
(2) CAUA	40	134.6	129.3	124.7	137.3	115.7	145.6
800	42	139.0	131.6	129.0	140.0	120.0	148.0
WITH	45	145.6	134.2	135.4	144.0	126.4	151.6
CCUA 150 E	48	153.0	139.8	142.2	147.6	132.8	156.0
CCUA 150 E	50	157.5	140.6	147.0	149.9	137.2	154.3
(1) CAUA	40	156.0	150.8	141.5	160.0	133.8	168.5
800 AND	42	161.3	153.3	150.1	162.8	138.7	171.6
(1) CAUA	45	169.3	157.1	157.6	167.0	146.1	176.3
1000 WITH	48	178.0	161.0	165.5	171.3	153.7	181.5
CCUA 180 E	50	183.4	163.3	170.8	172.8	158.6	184.1
CCOA 180 E	40	69.3	61.7	64.3	66.5	59.3	70.3
CAUA 1000	42	71.6	62.8	66.6	67.5	61.6	71.6
WITH	45	75.1	64.5	70.1	69.0	65.1	73.5
CCUA 075 E	48	77.8	65.3	73.7	70.3	68.4	75.0
00000000	50	81.1	66.4	76.2	71.4	70.8	76.2
	40	74.0	72.1	69.3	76.9	64.2	80.8
CAUA 1000	42	76.3	73.2	71,6	77.8	66.7	82.0
WITH	45	79.7	75.0	75.1	79.2	70.5	83.7
CCUA 080 R	48	82.2	76.7	79.1	80.8	74.2	85.6
3007100011	50	86.1	77.9	81.4	82.2	76.8	87.3
	40	88.7	85.9	82.7	91.3	76.2	95.7
CAUA 1000	42	91.8	87.5	85.6	92.8	78.9	96.6
WITH	45	96.5	90.0	89.9	95.0	82.9	100.5
CCUA 100 E	48	101.5	92.0	94.4	97.5	87.3	103.2
	50	104.6	93.3	97.3	99.2	90.0	105.1
	40	89.9	89.1	83.9	94.2	77.8	98.7
CAUA 1000	42	92.9	90.5	86.8	95.6	80.6	100.2
WITH	45	97.6	92.3	91.3	97.8	84.8	102.8
CCUA 100 R	48	102.3	94.3	95.9	99.9	89.3	105.5
1 222	50	105.5	95.5	99.0	101.3	92.4	106.8
(2) CAUA	40	138.7	123.3	128.5	132.0	118.7	140.7
1 (2,0000	42	143.2	125.6	133.2	135.0	123.2	143.8
1000		1	1		_		+
1000 WITH	45	150 2	129.0	1 140.2	138.0	130.2	147.0
1000 WITH CCUA 150 E	45 48	150.2 155.6	129.0	140.2	140.6	130.2	150.0

TABLE 16-1 — System Capacity Data — Air-Cooled Condenser with Compressor Chiller (cont.)

AIR-COOLED	LEAVING			AMBIEN RING CO			
CONDENSER COMPRESSOR	CHILLED WATER	8	5	95	5	10	5
CHILLER	TEMPERATURE (F)	TONS	ĸw	TONS	кw	TONS	кw
(1) CAUA	40	159.0	145.2	145 5	155.5	133 9	165 5
1000 AND	42	165 1	147 8	153 7	158.2	1416	167 0
(1) CAUA	45	1743	151 7	166 0	162.3	153.1	172.3
1200 WITH	48	181 3	154.0	170 4	165 3	156 6	176 4
CCUA 180 E	50	187.7	156 5	175.7	167 4	162.2	178 5
(2) CAUA	40	177.3	171 7	165.5	182.7	152.5	191 3
1000	42	183.6	175 0	171 2	185 6	1578	196.6
WITH	45	196.0	180 6	179.8	170 0	165 8	201 0
CCUA 200 E	48	205.9	184 0	188 4	193 0	175 6	206 4
	50	209.3	186.7	194 7	198.3	180 4	210 1
	40	89 7	83.5	83.5	89 0	77 0	94 1
CAUA 1200	12	93.5	85 0	87 1	90.7	80 0	96 0
WITH	45	99 2	87 2	92 5	93.3	84 5	98 8
CCUA 100 E	48	103.5	88 7	96.5	95 0	88.2	101 0
	50	106.6	90.0	99 5	96 0	914	102.3
	40	92.7	86.8	86 4	92.2	80.2	97 1
CAUA 1200	42	95.8	88.0	89.6	93.6	83.2	98.6
WITH	45	100.7	89.8	94 1	95.6	87 7	100.9
CCUA 100 R	48	105.9	915	99 1	97.5	92.3	103 1
	50	109 1	92.5	102.4	98.8	95.4	104 5
	40	1110	108.0	103.8	1148	96.5	121 3
CAUA 1200	42	114.4	109.7	107 1	116.8	99.7	123.4
WITH	45	119.6	112.3	112.2	119.7	104.5	126 7
CCUA 120 R	48	125.0	114.8	117.3	122.6	109.3	129.8
	50	128.6	116.4	120 6	124 4	112 7	131 8
(2) CAUA	40	179.4	165.6	157.0	177.9	154.0	188.3
1200	42	187.0	170 0	174 2	181 4	160 0	192.0
WITH	45	198 4	174 4	185 0	186.6	168.0	197 6
CCUA 200 E	48	212.4	188.0	197 6	200.0	182 8	202.0
	50	213 1	180.1	199.0	192.0	182.8	204.7

NOTES:
(1) Kw is for compressor only.
(2) Capacities are at a 10 F Δt.

NOTES:
(1) Kw is for compressor only.
(2) Capacities are at a 10 F Δt.

Building	Cooling System Energy	Savings	Energy	Building	Cooling System Energy	Savings	Energy
F (7)	After Previous ECO's (RWH/Yr	@10%	Svg \$/Y		After Previous ECO's (kWH/	@10%	Svg \$/Yr
9	5,818	512	\$38	186	5,480	482	\$36
41A	10,925	961	\$72	506	49,146	4,325	\$323
48	7,726	680	\$51	207	75,188	6,617	\$494
47	7,726	680	\$51	208	79,324	6,981	\$521
51A	12,694	1,117	\$83	209	869'96	3,229	\$241
ক্র	7,726	680	\$51	210	25,095	2,208	\$165
8	4,800	430	\$32	212	12,278	1,080	\$81
81	9,488	835	29\$	229	79,326	6,981	\$521
131	5,265	463	\$35	230	79,326	6,981	\$521
149	6,656	586	\$44	240	98,836	786	\$59
161	3,672	341	\$25	287	18,628	1,639	\$122
2	3,672	341	\$25	280	11,806	1,039	\$77
177	10,869	926	\$71	291	7,313	4	\$48
178	12,405	1,092	\$81	295	150,203	13,218	\$986
182	3,120	275	\$20	301	22,620	1,991	\$148

Building	Construction Cost	Units	No.	Labor	Total	Material	Total	Total cost
6	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$986
41a	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$986
46	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$986
47	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$986
51a	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
<u> </u>	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL		1					\$986
54	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$966
80	Wood Screeen	sf	200	\$1	\$268	\$6	\$1,176	\$1,444
	Wood Column	LF	40	\$7	\$277	\$6	\$252	\$529
	TOTAL							\$1,973
81	Wood Screeen	sf	400	\$1	\$536	\$6	\$2,352	\$2,888
	Wood Column	LF	80	\$7	\$554	\$6	\$503	\$1,058
	TOTAL							\$3,946
131	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL				1			\$986
149	Wood Screeen	sf	150	\$1	\$201	\$6	\$882	\$1,083
	Wood Column	LF	50	\$7	\$347	\$6	\$315	\$661
	TOTAL							\$1,744
161	Wood Screeen	sf ·	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL	- 	1					\$986
162	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
195	Wood Column	LF.	20	\$7	\$139	\$6	\$126	\$264
	TOTAL		 					\$986
177	Wood Screeen	sf »	250	\$1	\$335	\$6	\$1,470	\$1,805

ECO B2 Sheet 10 of 13

	IMage Column	lie.	20.1	\$7	\$208	\$6	\$189	\$397
	Wood Column	LF	30	\$7	\$208	36	2109	
	TOTAL				2405	-	\$560	\$2,202
178	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$986
182	Wood Screeen	sf	800	\$1	\$1,072	\$6	\$4,704	\$5,776
	Wood Column	LF	60	\$7	\$416	\$6	\$377	\$793
	TOTAL							\$6,569
186	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$966
206	Wood Screeen	sf	250	\$1	\$335	\$6	\$1,470	\$1,805
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
***************************************	TOTAL							\$2,069
207	Wood Screeen	sf	1000	\$1	\$1,340	\$6	\$5,880	\$7,220
	Wood Column	LF	100	\$7	\$693	\$6	\$629	\$1,322
	TOTAL							\$8,542
208	Wood Screeen	sf	1000	\$1	\$1,340	\$6	\$5,880	\$7,220
	Wood Column	LF	100	\$7	\$693	\$ 6	\$629	\$1,322
	TOTAL							\$8,542
209	Wood Screeen	sf	400	\$1	\$536	\$ 6	\$2,352	\$2,888
	Wood Column	LF	30	\$7	\$208	\$6	\$189	\$397
	TOTAL							\$3,285
210	Wood Screeen	sf	500	\$1	\$670	\$6	\$2,940	\$3,610
	Wood Column	LF	40	\$7	\$277	\$6	\$252	\$529
	TOTAL							\$4,139
212	Wood Screeen	sf	200	\$1	\$268	\$6	\$1,176	\$1,444
	Wood Column	LF	30	\$7	\$208	\$6	\$189	\$397
	TOTAL							\$1,841
229	Wood Screeen	sf	1000	\$1	\$1,340	\$6	\$5,880	\$7,220
	Wood Column	LF	100	\$7	\$693	\$6	\$629	\$1,322
	TOTAL							\$8,542
230	Wood Screen	sf	1000	\$1	\$1,340	\$6	\$5,880	\$7,220
	Wood Column	LF	100	\$7	\$693	\$6	\$629	\$1,322
	TOTAL		1					\$8,542
240	Wood Screeen	sf	600	\$1	\$804	\$6	\$3,528	\$4,332
	Wood Column	LF	50	\$7	\$347	\$6	\$315	\$661
	TOTAL							\$4,993

287	Wood Screeen	sf	200	\$1	\$268	\$6	\$1,176	\$1,444
	Wood Column	LF	30	\$7	\$208	\$6	\$189	\$397
	TOTAL							\$1,841
290	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$986
291	Wood Screeen	sf	100	\$1	\$134	\$6	\$588	\$722
	Wood Column	LF	20	\$7	\$139	\$6	\$126	\$264
	TOTAL							\$986
295	Wood Screeen	sf	1000	\$1	\$1,340	\$6	\$5,880	\$7,220
	Wood Column	LF	100	\$7	\$693	\$6	\$629	\$1,322
	TOTAL							\$8,542
301	Wood Screeen	sf	2000	\$1	\$2,680	\$6	\$11,760	\$14,440
	Wood Column	LF	250	\$7	\$1,733	\$8	\$1,573	\$3,305
	TOTAL							\$17,745

Building	Bare Cost	Construction Investment O&M/YR	Investmen	O&M/YR	O&M	Energy	Energy	Savings	Savings	Payback	SIR
		Total	Total	Saved	rcc \$	Svg/Yr	\$ 2	Total \$/Yr	\$ CC	Years	
و	\$986	\$1,539	\$1,718	(\$25)	(\$274)	\$38	\$447	\$14	\$173	126.8	0.101
414	\$986	\$1,539	\$1,718	(\$25)	(\$274)	\$72	\$839	\$47	\$565	36.5	0.329
94	\$986	\$1,539	\$1,718	(\$25)	(\$274)	\$51	\$593	\$26	\$319	629	0.186
47	\$986	\$1,539	\$1,718	(\$25)	(\$274)	\$51	\$593	\$26	\$319	629	0.186
51A	\$986	\$1,539	\$1,718	(\$25)	(\$274)	\$83	\$975	\$59	\$701	29.2	0.408
2	\$986	\$1,539	\$1,718	(\$25)	(\$274)	\$51	\$593	\$26	\$319	629	0.186
8	\$1,973	\$3,077	\$3,431	(\$48)	(\$548)	\$32	\$376	(\$17)	(\$173)	(199.2)	(0.050)
5	\$3,946	\$6,155	\$6,862	(66\$)	(\$1,097)	\$62	\$729	(\$36)	(\$368)	(188.7)	(0.054)
131	\$986	\$1,539	\$1,718	(\$22)	(\$274)	\$35	\$404	\$10	\$130	173.3	0.076
149	\$1,744	\$2,720	\$3,033	(\$44)	(\$485)	ž	\$511	3	\$26	35169	0.00
5	\$886	\$1,539	\$1,716	(\$25)	(\$274)	\$25	\$297	5	\$23	2271	0.013
162	\$88\$	\$1,539	\$1,716	(\$25)	(\$274)	\$25	\$297	15	\$23	2271	0.013
171	\$2,202	\$3,434	\$3,829	(\$22)	(\$812)	\$71	\$835	\$18	\$223	234.9	0.058
178	\$986	\$1,539	\$1,718	(\$25)	(\$274)	\$81	\$953	\$57	\$678	30.2	0.395
182	\$6,569	\$10,247	\$11,425	(\$164)	(\$1,826)	\$20	\$240	(\$144)	(\$1,587)	(79.5)	(0.139)
8	\$986	\$1,539	\$1,718	(\$25)	(\$274)	\$38	\$421	\$11	\$147	151.7	0.085
8	\$2,069	\$3,228	\$3,599	(\$25)	(\$255)	\$323	\$3,774	\$271	\$3,199	13.3	0.889
202	\$8,542	\$13,324	\$14,858	(\$214)	(\$2,375)	\$494	\$5,774	\$280	\$3,400	53.1	0.229
8	\$8,542	\$13,324	\$14,856	(\$214)	(\$2,375)	\$521	\$6,092	\$307	\$3,717	48.4	0.250
8	\$3,285	\$5,123	\$5,713	(\$85)	(\$913)	\$241	\$2,818	\$159	\$1,905	38.0	0.334
230	\$4,139	\$6,456	\$7,198	(\$103)	(\$1,151)	\$165	\$1,927	\$61	\$777	117.5	0.108
212	\$1,841	\$2,871	\$3,201	(\$46)	(\$512)	\$81	\$943	\$35	\$431	92.6	0.135
529	\$8,542	\$13,324	\$14,856	(\$214)	(\$2,375)	\$521	\$6,092	\$307	\$3,717	48.4	0.250
83	\$8,542	\$13,324	\$14,856	(\$214)	(\$2,375)	\$521	\$6,092	\$307	\$3,717	48.4	0.250
240	£,983	\$7,788	\$8,664	(\$125)	(\$1,388)	\$59	989\$	(99\$)	(\$702)	(131.2)	(0.081)
287	51.841	\$2,871	\$3,201	(\$46)	(\$512)	\$122	\$1,431	9/\$	\$918	42.0	0.287
82	\$886	\$1,539	\$1,718	(\$25)	(\$274)	\$77	206\$	\$53	\$632	32.5	0.369
28	\$986	\$1,539	\$1,716	(\$25)	(\$274)	\$48	299 \$	\$23	\$287	73.5	0.168
282	\$8,542	\$13,324	\$14,856	(\$214)	(\$2,375)	\$986	\$11,535	\$772	\$9,161	19.2	0.617
301	\$17,745	\$27,679	\$30,863	(\$444)	(\$4,933)	\$148	\$1,737	(\$582)	(\$3,196)	(104.6)	(0.104)
Total	\$107,878	\$168,273	\$187,625	*****	****	\$5,083	\$59,474	\$2,386	\$29,483	78.6	0.157
					- 7,77						

(\$3697) (\$29,990) Construction Cost....Installed Cost

O&M/YR......Yearly maintenance scheduled as 2.5% of installed cost

Sales Tax.....8% of total

OH & P......Contractors overhead and profit 30% Bond.....1%

Contingency......Estimators contingency 10%

Life Cycle Cost Analysis Summary ECO B2 Energy Conservation Investment Program (ECIP) Sheet 13 fo 13

•	Fort Hunter Lig Install Shades ov ion Name: ECO#	er HVAC Condensers	Region No. 4			Project No. Fiscal Year	
	: March 1993	. 6-2	Economic Life:	15	YEARS	Preparer: Ki	ELLER & GANNON
1. Investmen	t Costs			_			
A. Constructi	on Costs		\$168,273	_			
B. SIOH			\$9,255	_			
C. Design Co			\$10,096	-			
	(1A+1B+1C)		\$187,624		44		
_	alue of Existing E	• -			\$0		
	ty Company Reb stment (1D-1E-1F				\$0	\$187,63	24
	vings (+)/Cost(-): R 85-3273-X Use	d for Discount Factors		_			
					Discount	Diagonata	
Energy	Cost	Saving	Annual \$		Discount	Discounted	
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)	
A. Elec.	\$18.23	279	\$ 5, 06 3		11.70	\$59,47	
B. Dist	\$4.98	0	\$0 ::.		13.78	\$0	
C. Propane	\$7.87	0	\$0 🗇		14.16	\$0 ·	-
D. Other							
E. Demand S	avings			.			
F. Total			\$5,083			\$59,47	1
3. Non Energ	y Savings (+) or	Cost (-):		_			
A. Annual Re			(\$2,697)	-			
	Factor (Table A)				11.12	_	
(2) Discounte	d Savings/Cost (3A x 3A1)				(\$29,99	11)
B. Non Recur	ring Savings (+)	or Cost (-)					
Item	Savings(+)	Year of	Discount		Doscounted Sav-	•	
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)		
a.			ger-				
b							:
c.		··	<u> </u>	:			
d. Total							
C Total Non E	Energy Discounte	d Savings (3A2+3Bd4)		(\$29,991)		
		A+(3Bd1/Economic Li	ife)):		78.6	Years	
	iscounted Saving				\$29,480		
	investment Ratio				0.16		
7. Adjusted In	ternal Rate of Re	tum (AIRR):			-9.60%		

Σ	Keller	&	Gannon
	Enginee	rs-	-Architects

CHECKED BY BIH	ECO B3	PROJECT 16 403 -10 FHL - ZEAP
DATE HANCH 19 23 REV. 100 5 19 93	INSULATE DUCTWORK	SHEET NOOF SHEETS

DESCRIPTION OF ALTION

Insulate ductwork exposed to the ambient. Existing ductwork is either not insulated, or has deteriorated insulation, making it ineffective.

BUILDINGS INCLUDED.

127 INSULATE FURNACE CASING ABOUTE FIREBOX
146 INSULATE 305F OF SA DUCT OUTSIDE HTG ONLY 50-160

ENERRY SAVING CALCUCATIONS

BLOG 127 FURNACE CASING AREA: ~45 SF TEMP OF CASING ~ 140°F INHECHTIM BLOG 146 30SF DUCT -HEATING ONLY 120°F OUTSIDE

BLOG ΔΤ

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BCDG 146 = 0.092/0.62 = 0.15 Mil BTUly Propers

Σ	Keller	&	Gannon
	Enginee	rs-	-Architects

COMPUTED BY BIH

CHECKED BY

DATE HANCH 1993

INSULATE DUCTWORK

SHEET NO. Z OF SHEETS

PROPANE SAUED 3TH HIL BHU/Yr 0.15 MIBTU/Yr

COST SAUED # 16.68

E# 7.87/MIBHU

LCC SAUED, # 235 576.02 # 16.67

N=154R, UPW=14.16

Refer to Cost estimaks
and LCC Analyses
on Coilowing
sheets.

NO Additional OLM costs assumed

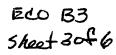
AIR LEAKAGE CONSIDERATIONS

for losses of about 10% or higher.

Insulating Lecteork, including retaping of Lucteork joints don reduce such losses by as much as so to.

The two buildings evaluated for this ECO do not qualify for such savings (due to insulation installation aloxe) as the dectwork in building 146 is only exposed outside (305F) and the SA Lucteork runs suiside the conditional space of this shop building. The insulation vetro fit for building 127 addresses only the builder, not dectwork,

Leakage from HVAC Luctwork con account



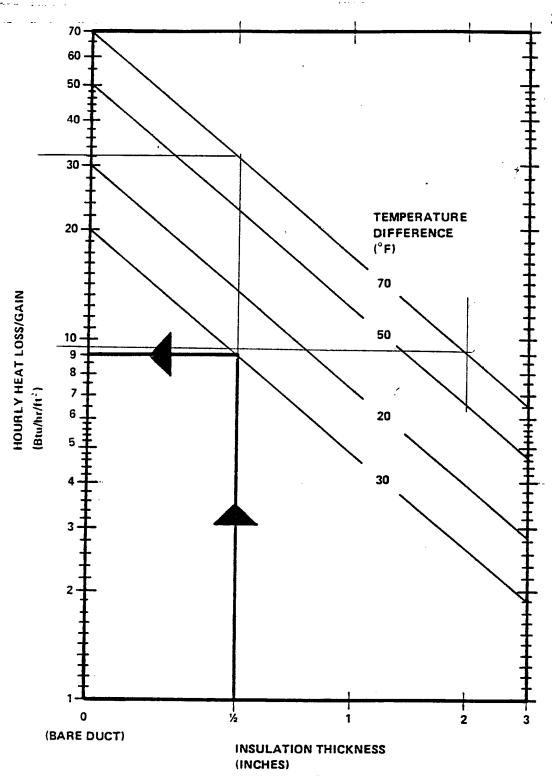


FIGURE 8-46. DUCT INSULATION-HEAT LOSS/GAIN FOR VARIOUS THICKNESS

				Date Prepared		Sheet C)F			
CONSTRUCTION COST ES	TAMIT	E		February ⁻	1993	4	6			
Project				Project No.	Basis for	Estimate				
EEAP Limited Energy Study				16-403-10]					
Location				Code A (no design competed)						
Fort Hunter-Liggett, California Engineer-Architect										
Keller & Gannon										
Drawing No.		Estimator			Checked	Ву				
ECO-B3 Insulate Ductwork		RJB			ВІН					
		antity		abor		Material				
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost			
Building 127										
2-inch Thick Insulation - FG	45	SF	1.92	\$87	1.20	\$54	\$141			
Weatherproof, Non-metallic	45	SF	5.80	\$261	3.48	\$156	\$417			
Subtotal Building 127							\$558			
Sales Tax 8%							\$45			
Contractor O.H. & P 30%							\$45			
Sub Total							\$647			
Bond 1%							\$6			
Sub Total							\$654			
Estimating Contingency 10%							\$65			
Total Probable Construction Cost							\$719			
Building 146										
2-inch Thick Insulation - FG	30	SF	1.92	\$58	1.20	\$36	\$94			
Weatherproof, Non-metallic	30	SF	5.80	\$174	3.48	\$104	\$278			
Subtotal Building 146							\$372			
Sales Tax 8%							\$30			
Contractor O.H. & P 30%							\$30			
Sub Total					1		\$432			
Bond 1%							\$4			
Sub Total							\$436			
Estimating Contingency 10%							\$44			
Total Probable Construction Cost							\$479			

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*

Life Cycle Cost Analysis Summary ECO B3 Energy Conservation Investment Program (ECIP) Sheet 5 fo 6

	Fort Hunter Ligge Insulate Ductwork,	Building 127	Region No. 4			Project No. 16-40 Fiscal Year FY9
Discrete Portion Analysis Date:	on Name: ECO# B : June 1993	-3	Economic Life:	15	YEARS	Preparer: KELLE
1. Investment	Costs			_		
A. Construction	n Costs		\$719	_		
B. SIOH			\$40	_		
C. Design Cos	st		\$43	_		
D. Total Cost			\$802	_		
	lue of Existing Equ	ipment			\$0	_
	y Company Rebate				\$0	
	tment (1D-1E-1F)					\$802
	,					
2. Energy Sav	rings (+)/Cost(-):			_		
Date of NISTIF	R 85-3273-X Used f	or Discount Factor	s			
F	Cost	Saving	Annual \$		Discount	Discounted
Energy	Cost	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
Source	\$/MTBU/(1)	MBTO/TH(2)	Gavings(c)		1 45151(1)	
A. Elec.	\$18.23	0	\$0		11.70	\$0
B. Dist	\$4.98	0	\$0		13.78	\$0
C. Propane	\$7.87	5.2	\$41		14.16	\$576
D. Other			•			•
E. Demand Sa	avings		•			•
F. Total	9-		\$41	=		\$576
3. Non Energy	y Savings (+) or Co	ost (-):		-		
A. Annual Red	curring (+/-)		\$0			
	actor (Table A)			-	11.12	
` '	d Savings/Cost (3A	x 3A1)				\$0
		01()				
B. Non Hecuri	ring Savings (+) or	Cost (-)				
Item	Savings(+)	Year of	Discount		Doscounted Sav-	
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)	
a.						
b.						•
C.			•			•
d. Total				=		•
d. Total						
C Total Non E	nergy Discounted	Savings (3A2+3Bd	14)		\$0	
4. Simple Pav	back 1G/(2F3+3A-	+(3Bd1/Economic	Life)):		19.7	Years
	iscounted Savings				\$576	
	Investment Ratio (S				0.72	
•	ternal Rate of Retu	·			Negative	

File: F\PROJ\1640310\ENGR\ECO\LCC-B3A.WQ1

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP) Sheet 6 to 6

ECO B3

Location: Project Title:	Fort Hunter Ligg	•	Region No. 4			Project No. 16-40 Fiscal Year FY96
Discrete Port	ion Name: ECO# 1	3-3				
' Analysis Date	e: March 1993		Economic Life:	15	YEARS	Preparer: KELLER
1. Investmen	t Costs			_		
A. Constructi	on Costs		\$479	_		
B. SIOH			\$25	_		
C. Design Co	st		\$29	_		
D. Total Cost	(1A+1B+1C)		\$535	_		
E. Salvage V	alue of Existing Eq	uipment			\$0	_
F. Public Utili	ity Company Reba	te			\$0	
G. Total Inve	stment (1D-1E-1F)					\$535
2 Fnerov Se	vings (+)/Cost(-):					
		for Discount Facto	ors .	-		
_			A		Discount	Discounted
Energy	Cost	Saving	Annual \$			
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
A. Elec.	\$18.23	0	\$0		11.70	\$0
B. Dist	\$4.98	0	\$0		13.78	\$ 0
C. Propane	\$7.87	0.15	\$1		14.16	\$17
D. Other						_
E. Demand S	avings					
F. Total			\$1			\$17
0 N 5		N4 (N:				
3. Non Energ	y Savings (+) or C	OST (-):		-		
A. Annual Re	curring (+/-)		\$0	_		
(1) Discount	Factor (Table A)				11.12	
(2) Discounte	ed Savings/Cost (3	A x 3A1)				\$0
B. Non Recu	rring Savings (+) o	or Cost (-)				
		,				
ltem	Savings(+)	Year of	Discount		Doscounted Sav-	
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)	
a.				-		
b.			-			3
c.			_			•
d. Total				-		•
d. Total						
C Total Non	Energy Discounted	Savings (3A2+3B	d4)		\$0	
4. Simple Par	yback 1G/(2F3+3/	A+ (3Bd1/Economic	: Life)):		452.9	Years
	Discounted Saving	•			\$17	
	Investment Ratio	,			0.03	
-	nternal Rate of Ret	• •			Negative	
,					-	

Keller & Gannon
Engineers-Architects

COMPUTED BY RUB TO D-4

CHECKED BY BIH

DATE MANCH 1973

REV. JUNE 1978

FROM THE COMPUTED BY THE PROJECT 13-403-10

SHEET NO. 1 OF RO SHEETS

•	DEERERT	OH OP ACTION		
	STEAM, It	or LATER, COHDELL	SATE AND C	HLLED
	HATTER T	APHE FOR HUM	e Applicat	ints idenced
	IS HOT I	ASULITED LINE	BE IHSUL	ATED.
•		REPORTE UHLA		
	IL ATO U	IT OF THE LURIC	and Fullos	ンゴオン
	THU- 1140	hourse overin	- HEATHER !	アナン
<u> </u>	COUNTS	TEPPI WEHLY		ere androne ere
	FACILITY	is litempter		en e
	BUDG		720	
		206	238	
_	80	207	241	
_	81	208	287	
	124	209	290	
-	127	212	291	
	13-1	219		
- · ·	190	229		
	197	230		

June 1993)
(Revised
PIPING
ATE HW
1-4 INSUL
ECO B

																		<u>.</u>	Savings to	Invest	Ratio	2.08	0.57	1.43	8.60	2.01	2.01	2.26	4.45	2.01	2.01	2.04	2.14	0.83	7.22	2.40
Savings to	Invest	Ratio	3.11	0.30	1.9.	3.12	2.15	2.15	3.31	3.45	2.15	2.15	3.03	2.27	0.74	8.45	2.48		Investment :		49	\$671	\$305	\$197	\$186	\$312	\$312	\$ 131	\$134	\$312	\$312	\$134	\$302	\$268	\$148	\$3,766
investment		•	\$ 391	\$243	\$117	\$ 467	\$243	\$243	\$78	\$157	\$243	\$243	\$78	\$243	4 00	\$122	\$3,115		Construction	Cost	•	\$802	\$274	\$176	\$167	\$280	\$280	\$118	\$120	\$280	\$280	\$120	\$274	\$208	\$134	\$3,378
Construction	Cost	••	\$351	\$218	\$105	\$419	\$218	\$218	\$70	\$140	\$218	\$218	\$70	\$218	\$328	\$109	\$2,784		Bare	Cost	**	\$386	\$175	\$113	\$107	\$179	\$178	\$75	\$77	\$179	\$179	\$77	\$178	\$326	\$86	\$2,166
	Cost	•	\$225	\$140	\$68	\$269	\$140	\$140	\$45	08\$	\$140	\$140	\$45	\$140	\$230	\$70	\$1,791		Total	LCC Save	44	\$1,406	\$175	\$281	\$1,597	\$626	\$626	\$296	\$598	\$626	\$626	\$275	\$654	\$471	\$1,079	\$8,038
Total	LCC Saved	•	\$1,217	\$ 73	\$225	\$1,455	\$523	\$523	\$258	\$540	\$5 23	\$523	\$237	\$552	\$294	\$1,028	\$7,750		Single	Year (#10)	\$ Saved	\$225	\$102	\$88	\$62	\$105	\$105	\$44	\$45	\$105	\$105	\$45	\$102	\$190	\$50	\$1,262
ည	_		\$1,315	\$134	\$254	\$1,571	\$583	\$583	\$278	\$579	\$583	\$583	\$258	\$613	\$ 394	\$1,059	\$8,527		8	Energy	*	\$1,315	\$134	\$254	\$1,571	\$583	\$583	\$279	\$578	\$583	\$583	\$258	\$613	\$ 394	\$1,059	\$8,527
O&M Cost	Saved	\$ /⊀	(\$8.77)	(\$5.48)	(\$2.63)	(\$10.47)	(\$5.46)	(\$5.46)	(\$1.75)	(\$3.51)	(\$5.46)	(\$5.48)	(\$1.75)	(\$5.46)	(\$8.97)	(\$2.73)	(\$69.84)		O&M Cost	Saved	\$\?	(\$12.04)	(\$5.47)	(\$3.53)	(\$3.33)	(\$5.60)	(\$5.60)	(\$2.35)	(\$2.41)	(\$2.60)	(\$5.60)	(\$2.41)	(\$5.48)	(\$10.18)	(\$2.68)	(\$67.56)
Total	Energy	₹,	\$92.87	\$9.44	\$18.43	\$114.04	\$42.33	\$42.33	\$19.68	\$40.92	\$42.33	\$42.33	\$18.10	\$43.46	\$28.21	\$74.77	\$610.46		Total	Energy	¥,7t	\$92.87	\$9.44	\$18.43	\$114.04	\$42.33	\$42.33	\$19.68	\$40.92	\$42.33	\$42.33	\$18.10	\$43.48	\$28.21	\$74.77	\$610.46
	ō	\$/₹	\$0.00	\$0.00	\$18.43	\$114.04	\$42.33	\$42.33	\$0.00	\$0.00	\$42.33	\$42.33	\$0.00	\$0.00	\$0.00	\$0.00	\$301.79			ö	\$/ ⊀	\$0.00	\$0.00	\$18.43	\$114.04	\$42.33	\$42.33	\$0.00	\$0.00	\$42.33	\$42.33	\$0.00	\$0.00	\$0.00	\$0.00	\$301.79
<u>s</u>	Propane	\$ / \$	\$92.87	\$9.44	\$0.00	\$0.00	\$0.00	\$0.00	\$19.68	\$40.92	\$0.00	\$0.00	\$18.10	\$42.50	\$25.97	\$74.77	\$307.72			Propane	₹	\$92.87	\$9.44	\$0.00	\$0.00	\$0.00	\$0.00	\$19.68	\$40.92	\$0.00	\$0.00	\$18.10	\$42.50	\$25.97	\$74.77	\$307.72
Cost Savings	Electric	¥,	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.96	\$2.24	\$0.00	\$0.98		Cost Savings	Electric	\$/ ∀ r	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.98	\$2.24	\$0.00	\$0.98
J	ō	MBTU/Yr	0.00	0.00	3.70	22.90	8.50	8.50	0.00	0.00	8.50	8.50	00.0	0.00	0.00	0.00	60.60	NOIL		ō	MBTU/Yr	0.00	0.00	3.70	22.90	8.50	8.50	0.00	00.0	8.50	8.50	0.00	0.00	0.00	0.00	60.60
	Propane		11.80	1.20	0.00	00.0	0.00	0.00	2.50	5.20	00.0	0.00	2.30	5.40	3.30	9.50	39.10	PE INSULA		Propane	MBTU/Yr	11.80	1.20	00.0	0.00	0.00	0.00	2.50	5.20	0.00	0.00	2.30	5.40	3.30	9.50	39.10
Savings			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	00.0	15.40	36.00	0.00	15.40	YT = IAN	Savings	Electric	KWH	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	00.00	0.00	0.00	15.40	36.00	0.00	15.40
Savings	Building	•	80	20	190	206	207	208	508	219	229	230	238	241	290	291	SIR > 1	WITH REMOVABLE TYPE INSULATION		Building	ì	80	18	180	208	207	208	209	219	229	230	238	241	290	291	SIR > 1

Energy Savings from attached hand calculations

Electricity \$0.0622 per kWHr, UPW = 11.70

Propane \$7.87 per MBTU, UPW = 14.16

Fuel Oil \$4.98 per MBTU, UPW = 13.78

O&M: Without 'Zip' type 2.5% Constr Cost, With "Zip' type, 2%; also assume saved replacement cost at yr 10 at 1/2 Investment for removal & repair with removable type insulation.

Engineers-Architects

COMPUTED BY RUB FOOT BY	PROJECT 16-403-10
CHECKED BY BIH 1933 WAS LATE FITTHAS	
REV. JUNE 1973 HEATLOSSIGHT CALMUITO	SHEET NO. 3 OF 30 SHEETS

HET LAYER HEATHS

190° SUPPLY /170° RETURN => 180° AME

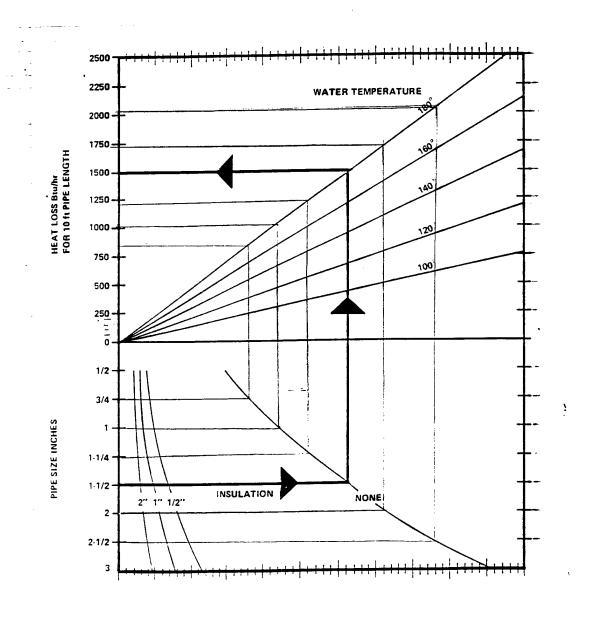
USE POE" EHERAY CONSEIRNATION

WHENCE THE RESERVATION

WHENCE THE RESE

14 EXISTING BUILDINGS P14. 8-47"

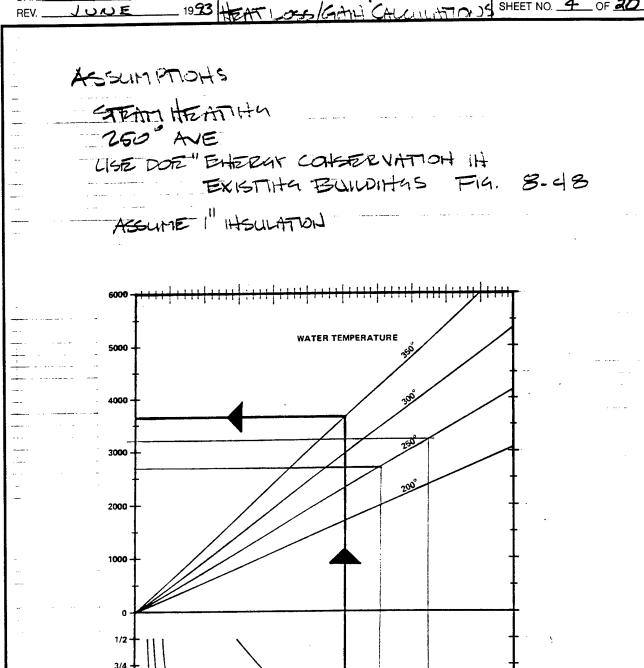
INSULATION



Keller & Gannon

Engineers-Architects

COMPUTED BY RUB	FGO# B-4	PROJECT 16-403-10
CHECKED BY THE	WELL SE DOE TENTHAS	
DATE 197.3	INSCITE FIRE	SHEET NO. 4 OF 30 SHEETS
HEV JUNE 1920	HEAT LOSS/GANI CALCULATIONS	STILL INOOTOTTLETO



1-1/4

2-1/2

2" 1" 1/2"

INSULATION

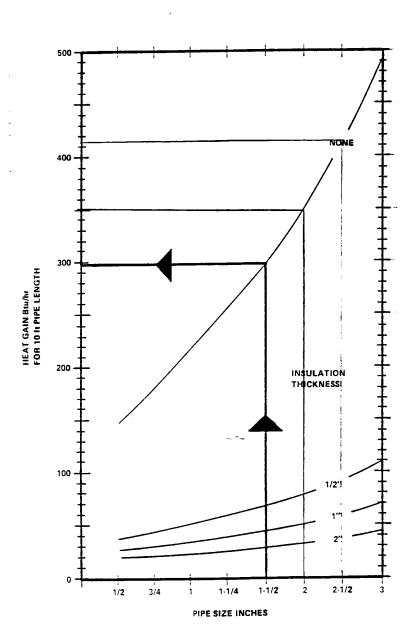
Keller & Gannon

Engineers-Architects

COMPUTED BY ZJB	F . * B-4	PROJECT 16-403-10
CHECKED BY BIH	HISULATE PIPE + FITTINGS	FIT ETTP
	HENT LOSSIGNH CALCULATIONS	SHEET NO. 5 OF 40 SHEETS

ASSUMPTIONS
CHILLED LIMER COOLING
ASSUME USO LIMER
USIE ROE, "ENTERZY CONSERVATION IN
EXISTING BUILDINGS FIG. 8.49

ASSUME I" IHSULATION



Keller & Gannon

Engineers-Architects

COMPUTED BY 7.12	ECO" B4	PROJECT 15-403-10
CHECKED BY	When we BOE I SMILES	
DATE19T3	HEADER FIRE I THAT	20 015
REV. JUNE 1993	HEAT LOSS SAVIITAS &	SHEET NO. 6 OF 20 SHEETS

BLDG 6 - DOMESTIC HOT HATER HEATHY

BUTH 80- HOT LATER HEATHY

I'/2" PIPE @ SO FT WHIHSWATER

WO INSWLATION 150: BTW/HE IT LOSS

WI INSWLATION 25 BTW/HE IT LOSS

125 × 50 FT = 62 5 KBTWH

625 KBTWH × 59325 ° HZS/(70-24°)

8.06 MTWH / RP/68.5% EFF

= 11.8. MBTW/ MP (PROPHIE)

2" PIPE & 20 PT UHHHAULITED

WO IHSULATION 175 BTU/HR

IN IHSULATION 25 PTU/HR

150 BTU/HR 20 PT = 3 ICBTUH

2 ICBTUHX 13581"HRS/(10°-24°)

- 0.9 MBTU/TR/14"/ - 1.2 MBTU/TR

PLOG 124-DOMESTIC HAT: 12572 OHLY

Σ	Keller	&	Gannon
-			

Engineers-Architects

COMPUTED BY PUB	至00 34	PROJECT 16-402-10
CHECKED BY 511T DATE MITTER 1913	HEALTE PIPET FITHIS	THE TRAFF
REV. JUNE 1993	HEAT LOSS SITURUS de	SHEET NO. 7 OF 30 SHEETS

```
BLDG 127 - DOMESING LAT LATER SILY
   ZUDG 131 - DOMESTIC HOTILATER SHLY
    BLOG 190. HOT HATER HEATING
            "L" PIE FAMILIES E 15 FT EXPLIVILEIT LENTATH
      11/0 IHSULATION 125 BTUH/FF
      W/ HSULATION 20 BTUH/FT
                    105 BTUH/2 15" PT= 1.6 KBTUH
          16 BRUILX 32596°HZS/(70°-24°)
  = Z.7 MBTU/42/73.7% · 3,7 MBTU/42 (OIL)
   BLDG 197-DOMESTIC HET LATER OHLY
   BLDG 206
     4" PIPETAMINS 3" PIPETAMINS 11/2" PIPET FIMITIES
                          15 FT
                                            IOPT
        IOTT
WO HISCHOTTON 300 BTUH/PT 250 BTUH/PT
                                           150 BTUILIT
HINGULATION 75 PARITIFIT 60
                                            25 BRUHIFT
           225 BILIT/FT
                         170 BRHIFT
                                          125 BTUHLET
         × lo.fl
                        X 15 PT
2.85KBTU
                                         Y IQFT
                                           1.3 KB121
           2.3 KBTU
     = 6.45 KBTUVII5562° the (70°-24°)
          16.2 MBTCI / 70.8% EFF. = 22.9 MISTU / RE
```

Keller & Gannon

Engineers-Architects

COMPUTED BY 7213	FC0 B-4	PROJECT 10-403-10
CHECKED BY 514	We I ATT POET FITTINGS	
DATE MATICON 1912		SHEET NO. 8 OF 20 SHEET
REV	HATHER SAVITAGE	Officer No. 32 of

13LPA 207-

HOT LATER HEATING
21/2' PIPE + FITTHAS & 23 PT EQUIVELENT LENTATH

HO INSULATION 200 BITCH/PT H/INSULATION 35 BITCH/FT

165 BUH | FT x 20 7 = 3.3 KBTU

3.3 × 85,120°H/(70°-24°)= 6.1 MBTU/TR 6.1 + 71.4%= 8.5 MBTU/TR

BLD4 208

8.5 MBTU /12 (STE 201)

PLDG 209
HOT WATER HEATTHS

11/4" PRE FETTIMS & 10 PT EQUIVILENT LEATHTH

WID INSULTION 125 BTUHIFT

H/1HSULTMON 20 BTUHIFT

105 BTUHIFT 10 FT = 1 KBTUH

103 ETUHITIX 101-1- 1 PEICH -1 x 71,527° HR-/(70-24°) = 1.5 MBTU/TR T.5 + 51.2° %= 2,5 MBTU/TE (TROPINIE)

Σ	Keller	&	Gannon

Engineers-Architects

COMPUTED BY 72173	Ero* B-4	PROJECT 10-403-10
CHECKED BY BIH	WKULADE PRETENTINGS	
DATE 1913 REV. JUNE 1993	HEAT LOSS CHUITAS 4	SHEET NO. 9 OF 20 SHEETS

BLD9 212 DOMESTIC HOT ISMER OILT

1/2" RPE ATO ATTITAS

3/4" PIPE + FITHURS

WO INSULATION 150 BTU/HRIFT

15

170 BTU/X 10FT

170 BTU/X 10FT

185

170 BTU/X 10FT

1.35 KBTUHX 85120°HZ/(70"-24°)

= 3.51 MBTU/ 10:67% = 2.4 MISTU/TO (PROPINE)

8.5 MBTU /TD (SEE BLIZE 207)

230 85 MBTU/12 (SEE BLIDE 207)

Keller & Gannon

Engineers-Architects

COMPUTED BY 72.17	FCO # B-4	PROJECT Vo-ch3-10
CHECKED BY	THE POST TOTALLY	
DATE 1913	BUCITIETINGS	SHEET NO. 10 OF 30 SHEETS
REV 19 .73	HEAT LOSSIGAN CALLUMONS	OTTEET 140 07 07

```
BUDG 238
      HOT HATER HEATHY
WO INSULATION ISO BTU/HR FT
WINSULATION ZE BTU/HR FT

125 TTU/ x 10 FT " 1.25 EBTUH

TREFT
         11/2" PIPE AND PITTINGS.
          1.25 KBTUHX GO,531°H ((70°-24°)
          = 1.6 METUH/TR / 68.9% = 2.3 MISTUH (PROPANE)
BLD9 241
        STEAT HEATHY CHILLED DATER COOLITY
    HEATHA:
              2 1/2" RRE FRITHAS
     10 INSULATION
     HI HSULATION
                          275 BTUH/FFX 10FT = 2.75 KBTU
         2.75 KBTUHX 60531° HP/ (70°-24°)
= 3.6 MBTU/MR/66.6% = 5.4 MBTU/MR (PROPRITE)
              2" PAR + FITTHINGS
                        35 BTUH/ 5 25 CHI/PT
     W/O IHSULATION
     12/ 11/SULATION
                          3) BILLIH/PTY 10FT= , 3 KBTCIH
     ASSUME DERENO , KHH . O3
```

. OZKNH, 15420"110/(102-72") - 15,4 KUH/MZ

FORM 101-1/8

Σ	Keller	&	Gannon
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Engineers-Architects

COMPUTED BY PAH CHECKED BY PAH DATE MARCH 1993	ECO" B-d INSULATE PIPE + FITTINGS	PROJECT 16-403-10 FITC 5-5-0 SHEET NO. // OF 20 SHEETS
REV		SHEET NO. 77 OF 80 SHEETS

BLDG 287-DOMESTIC HOT WATER ONLY

BLOG 290 HH/HEATTHG CH/COULING HEATHS 1"0 PRE 1 FITTITIES WO INSULATION 100 BITCH/PT
H/INSULATION ZOBITCH/PT
BOBTCH/PT
20F = 1.6 KBTUH 1.6x 60,530°4/(70-24)= 2.1 MBTU/TR 2.1/63.8% FIT = 3.3+1BTU/TR (PROPANTE) COOLING
Z'/ " PIPE + FITTINGS 1/0 HEULATION 41 BTUH/PT H/HSOLATION 6 BTUH/FT 35 BTUH/FTX 20 FT = 0.7 KBTUH DICH = 0.7 / EER (ASSUME FETT = 0.07 KW 0.07 KW (15420= H)(102-72") = 36 KWH/ (Thire)

Keller & Gannon

Engineers-Architects

COMPUTED BY 72173	I Total	PROJECT 16-403-10
CHECKED BY THE		THE TRAP
0,	IHSLILATE PIPE + FITTHES	SHEET NO. 12 OF 20 SHEETS
REV	HEM LOSS/GAMI CALCULATIONS	SHEET NO. 12 OF 20 SHEETS

BUDA 291

STEAM HEATING 2" PIPE + FITTHES

1/0 1/501/17/0N 280 BTUH/PT 205 BTUH/PT x 10PT = 2.05 KBTUH

2.05 KBTUHX 60531 34 (70-24")= 5.7 MBTU/TR 5.7/59.8 % = MBTU/TE

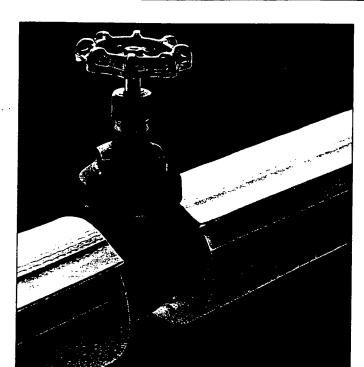
CONSTRUCTION COST ESTIMATE Project EEAP Limited Energy Study Location Fort Hunter-Liggett, California Engineer-Architect Keller & Gannon Drawing No. ECO# B-4 (Insulate Pipe & Fittings) Guantity Februal Project No. 16-403-1 Estimator RJB	Code A ('no design compete	nd)
Fort Hunter-Liggett, California Engineer-Architect Keller & Gannon Drawing No. Estimator ECO# B-4 (Insulate Pipe & Fittings) RJB	Checked B		,
Keller & Gannon Drawing No. ECO# B-4 (Insulate Pipe & Fittings) RJB Quantity Labor		Эу	
Drawing No. ECO# B-4 (Insulate Pipe & Fittings) RJB Quantity Labor		В у	
Quantity Labor			
	I M	BIH	
Line Item No. Unit Per Units Meas. Unit Total	Per Unit	aterial Total	Total Cost
Building 80			
	125 \$2.00	\$100	\$225
Subtotal Bldg 80			\$225
Building 81			
2" Pipe Insulation 20 LF \$3.00 \$	60 \$4.00	\$80	\$140
Subtotal Bidg 81			\$140
Building 190			
1-1/4" Pipe Insulation 15 LF \$2.50 \$	38 \$2.00	\$30	\$68
Subtotal Bldg 190			\$68
Building 206		400	A45
1-1/2 Tipe insulation	25 \$2.00	\$20	\$45
o Tipe modiadon	53 \$5.00	\$75	\$128
T Tipe insulation	36 \$6.00	\$60	\$96 \$060
Subtotal Bldg 190			\$269
Building 207			
	60 \$4.00	\$80	\$140
Subtotal Bidg 207			\$140
Building 208			
Z-1/Z . Ipo moduacii	60 \$4.00	\$80	\$140
Subtotal Bldg 208			\$140
Building 209			
11/11/50 Modulus	25 \$2.00	\$20	\$45
Subtotal Bidg 209			\$45
Building 219			* -
071115011101111111111111111111111111111	25 \$2.00	\$20	\$45
172 1.50 110111111	\$25 \$2.00	\$20	\$45 \$90
Subtotal Bldg 219			\

				Date Prepared		Sheet Of	···
CONSTRUCTION COST ESTIMATE				February 1	993 /4 20		
				Project No.	Basis for E		
EEAP Limited Energy Study				!6-403-10	Code A (no design competed	45
Fort Hunter-Liggett, California						no design competer	-,
Engineer-Architect							
Keller & Gannon Drawing No.		Estimato			Checked B	y	
ECO# B-4 (Insulate Pipe & Fittings)			RJB			BIH	
Loon D 4 (modiate) ipo a i mange)		ntity		Labor	Per	aterial	Tabel
Line Item	No. Units	Unit Meas.	Per Unit	Total	Unit	Total	Total : Cost
Building 229							
2-1/2" Pipe Insulation	20	LF	\$3.00	\$60	\$4.00	\$80	\$140
Subtotal Bldg 229							\$140
Building 230							
2-1/2" Pipe Insulation	20	LF	\$3.00	\$60	\$4.00	\$80	\$140
Subtotal Bldg 230							\$140
Building 238							
1-1/2" Pipe Insulation	10	LF	\$2.50	\$25	\$2.00	\$20	\$45
Subtotal Bldg 238							\$45
Building 241							······································
2-1/2" Pipe Insulation		LF	\$3.00	\$30	\$4.00	\$40	\$70
2" Pipe insulation	10	LF	\$3.00	\$30	\$4.00	\$40	\$70
Subtotal Bidg 241							\$140
Building 290							
1" Pipe Insulation		LF	\$2.50	\$50	\$2.00	\$40	\$90
2-1/2" Pipe Insulation	20	LF	\$3.00	\$60	\$4.00	\$80	\$140
Subtotal Bldg 290							\$230
Building 291			A. 5. 5. 5		04.55		A=A
2" Pipe Insulation	10	LF	\$3.00	\$30	\$4.00	\$40	\$70 \$70
Subtotal Bldg 291		-					\$70
		·					
		-					
		4					

				Date Prepared		Sheet of		
CONSTRUCTION COST ESTIMATE				February	/3			
Project EEAP Limited Energy Study				Project No. 16-403-10	Basis for	Estimate		
Location Limited Energy Olddy				10 400 10	Code A	(no design comp	eted)	
Fort Hunter-Liggett, California Engineer-Architect								
Keller & Gannon								
Drawing No.		Estimat			Checked	-		
ECO# B-4 (Insulate Pipe & Fittings)	T Qu	antity	RJB	Labor	<u> </u>	BIH faterial		
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost	
Building 80	Rem	ovable	Insulat	ion				
1-1/2" Pipe Insulation	50	LF	\$2.50	\$125	\$5.22	\$261	\$386	
Subtotal Bldg 80							\$386	
		<u> </u>	<u> </u>					
Building 81			Insulat					
2" Pipe Insulation	20	LF	\$3.00	\$60	\$5.77	\$115	\$175	
Subtotal Bldg 81							\$175	
Building 190	Rem	ovable	Insulat	ion				
1-1/4" Pipe Insulation	15	ILF	\$2.50	\$38	\$5.04	\$76	\$113	
Subtotal Bldg 190							\$113	
		<u> </u>	<u> </u>					
Building 206	Rem	ovable	Insulat	ion				
1-1/2" Pipe Insulation	10	LF	\$2.50	\$25	\$5.41	\$54	\$79	
3" Pipe Insulation	15	LF	\$3.50	\$53	\$6.35	\$95	\$148	
4" Pipe Insulation	10	LF	\$3.60	\$36	\$7.08	\$71	\$107	
Subtotal Bldg 190		ļ					\$334	
Building 207	Remo	ovable	Insulat	ion				
2-1/2" Pipe Insulation		LF	\$3.00	\$60	\$5.97	\$119	\$179	
Subtotal Bldg 207	+ = -	- 	VO.100	750	VO.0.	7.70	\$179	
Building 208			Insulati					
2-1/2" Pipe Insulation	20	LF	\$3.00	\$60	\$5.97	\$119	\$179	
Subtotal Bldg 208							\$179	
Building 209	Remo	ovable	Insulati	ion				
1-1/4" Pipe Insulation		LF	\$2.50	\$25	\$5.04	\$50	\$75	
Subtotal Bldg 209							\$75	
Dullating 040	Da		lmer-l					
Building 219			Insulati		64.60	0.47		
3/4" Pipe Insulation		LF	\$2.50	\$25	\$4.66	\$47	\$72	
1-1/2" Pipe Insulation Subtotal Bldg 219	10	LF	\$2.50	\$25	\$5.22	\$52	\$77	

CONSTRUCTION COST ESTIMATE					ared ary 1	1993 /6 20			
Project EEAP Limited Energy Study					-10	Basis for Estimate Code A (no design competed)			
Fort Hunter-Liggett, California						Code A (no design compe	led)	
Engineer-Architect Keller & Gannon									
Drawing No.		Estimate	or			Checked B	у	·	
ECO# B-4 (Insulate Pipe & Fittings)			RJB				BIH		
Line Item	No. Units	untity Unit Meas.	Per Unit	Total		Per Unit Total		Total Cost	
Building 229	Remo	ovable	Insulat	ion					
2-1/2" Pipe Insulation	20	LF	\$3.00		\$60	\$5.97	\$119	\$179	
Subtotal Bldg 229								\$179	
Building 230	Remo	ovable	Insulat						
2-1/2" Pipe Insulation	20	LF	\$3.00		\$60	\$5.97	\$119	\$179	
Subtotal Bldg 230								\$179	
								······································	
Building 238			Insulat						
1-1/2" Pipe Insulation	10	<u>LF</u>	\$2.50		\$25	\$5.22	\$52	\$77	
Subtotal Bldg 238	_			<u> </u>				\$77	
		<u> </u>	1	<u> </u>					
Building 241			Insulat		*	¢5 07	\$60	600	
2-1/2" Pipe Insulation	10	LF	\$3.00		<u> </u>	\$5.97	\$60 \$56	\$90 \$86	
2" Pipe Insulation	10	LF	\$3.00	<u> </u>	\$30	\$5.59	\$50	\$176	
Subtotal Bidg 241								\$170	
Duilding 000	Pem	ovable	Insulat	ion		1			
Building 290			\$2.50		\$50	\$4.85	\$97	\$147	
1" Pipe Insulation 2-1/2" Pipe Insulation		LF	\$3.00	_			\$119	\$179	
Subtotal Bidg 290					•			\$326	
oubtotal bing 200									
Building 291									
2" Pipe Insulation	10	LF	\$3.00		\$30	\$5.59	\$56	\$86	
Subtotal Bidg 291								\$86	
			ļ						
		ļ							
		1	<u> </u>						
	_			<u> </u>					
		 		<u> </u>					
1	1		1	Ι,			1		

100 SERIES



For Light Duty Applications on Hot **And Cold Surfaces**

TMZ 175 Jacketed Flexible Polyurethane Foam Pipe Insulation

Use on Temperatures from -65°F to +220°F

Description: Thermazip® 100 Series consists of foam insulation laminated to a lightweight reinforced jacket. A patented locking trac, factory applied to the jacket, is used to snap Thermazip® on the pipe.

Uses and Applications: Suitable for light duty indoor applications on both hot and cold surfaces. Chemical resistance, plus ability to withstand repeated cleaning with detergents, makes this an excellent product for use where a clean appearance is important. Thermazip® 100 is used to insulate hot and cold pipes; control sweating and dripping pipes; protect personnel from burns; color code pipes; and control temperature of process liquids. Typical end users are: laundries, hospitals schools, offices and commercial buildings.

Available Forms: Available in standard 4-foot lengths or pre-cut to your specific requirements up to 25 feet to fit pipe and tube sizes up to 6 inches. Polyurethane foam insulation is standard in 1/2, 1 and 11/2 inch thicknesses.

ECO B4

Thermazip® Insulation SHEET 170F2C **Options and Specifications**

TMZ 100 Jacket

Description and Specification: Thermazip® 100 jacket is made of a strong polyester scrim laminated between 2 layers of PVC which provides excellent resistance to chemicals. The total thickness is .016 inches. Standard color is white, but red, blue, yellow or green is available.

Jacket Material and Properties	Values
Polyvinylchloride	
Polyester Fabric	11 x 11 scrim
Total Weight	10 oz./sa. vd.
Ambient Temperature Range	+40°F to +150°F
Tensile Strength	Warp: 120 lbs./in.
(Fed. Method 191, 5100)	
Tear Strength	
(Fed. Method 191, 5134)	
Cold Crack (Fed. Method 191, 5204)	+10°F
Fire Hazard Classification	. Self Extinguishing
(Fed. Method 191, 5903.2)	2 sec. max

Polyurethane Foam Type 75 Insulation

Description and Specification: The polyurethane foam used in the manufacture of Thermazip® is a highly stabilized polymeric material. Its physical properties are locked in so it resists further chemical reaction with elements in the environment. It is highly resistant to fungi and bacterial growth. It is formulated to meet nationally recognized flammability tests.

Insulation Material	Polyurethane Foam
Density	1.2 lbs./cu. ft
Indent Load Deflection (25%)	20 lbs
K Factor @ +75°F	0.27 BTU/hr/sq ft/°F/in
Service Temperature	65°F to +220°F
Fire Hazard Classification:	
California Bulletin #117	Pass
ASTM-D-1692 (UL Subject 94)	Pass
FAA 60 Second Vertical Burn	Pass
MVSS-302 Horizontal Burn	Pass

Specifications subject to change without notice. All statements and technical information contained herein are based on tests we believe to be reliable, but the accuracy or completeness is not guaranteed under all circumstances. All flammability ratings and specifications are based on laboratory tests and do not describe the performance of these materials in an actual fire situation. Before using Accessible Products Company products, the user shall determine suitability for the intended use, and user assumes all responsibility for improper selection.

Thermazip 100 Series Pipe Insulation

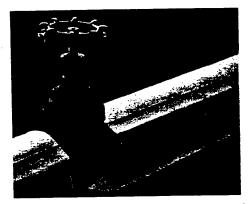
TMZ 175

Price List — Effective September 1, 1992 — Price Per Linear Foot

TMZ 100 Jacket Specifications

Jacket Description and Specification: Thermazip 100 jacket is made of a strong polyester scrim laminated between 2 layers of PVC which provides excellent resistance to chemicals. The total thickness is .016 inches. Standard color is white, but red, blue, yellow or green is available.

Jacket Material and Properties	Values
Polyvinylchloride	016 inches
Polyester Fabric	11 x 11 scrim
Total Weight	10 oz./sq./yd.
Ambient Temperature Range	+40°F to +150°F
Tensite Strenath	Warp: 120 lbs./in.
(Fed. Method 191, 5100)	Fill: 80 lbs./in.
Tear Strength	Warp: 24 lbs./in.
(Fed. Method 191, 5134)	Fill: 25 lbs./in.
Cold Crack (Fed. Method 191, 5204)	+10°F
Fire Hazard Classification	Self Extinguishing
(Fed. Method 191, 5903.2)	



Description: Thermazip 100 Series consists of foam or fiberglass insulation laminated to a lightweight reinforced jacket. A patented locking trac, factory applied to the jacket, is used to snap Thermazip on the pipe.

Thermazip Polyurethane Foam 75

The polyurethane foam used in the manufacture of Thermazip is a highly stabilized polymeric material. Its physical properties are locked in so it resists further chemical reaction with elements in the environment. It is highly resistant to fungi and bacterial growth. It is formulated to meet nationally recognized flammability tests.

Insulation Material	Polyurethane Foam
Density	1.2 lbs./cu. ft.
Indent Load Deflection 25%.	20 lbs.
K Factor @ +75°F	0.27 BTU/hr./sq. ft./°F/in.
Service Temperature	65°F to +220°F
Fire Hazard Classification:	
California Bulletin #117	Pass
ASTM-D-1692 (UL Subject	94)Pass
FAA 60 Second Vertical Bu	rnPass
MVSS-302 Horizontal Burn	Pass

CONVERSION CHART							lation
iron	Copper	Stnlss	TMZ	GUIDE	Convoluted		
Pipe	Tubing	Tubing	Size		1/2"	1"	1 1/2"
1/4	3/8	1/2	1/2	Α	3.43	4.38	
3/8	1/2		5/8	В	3.48	4,47	
- 0,0	5/8		3/4	С	3.57	4.57	
1/2	3/4		7/8	D	3.65	4.66	
3/4	<u> </u>	1	1	Е	3.73	4.75	6.03
	1	•	1 1/8	F	3.79	4.85	6.14
1	1 1/4		1 3/8	G	3.94	5.04	6.36
	 	1 1/2	1 1/2	Н	4.03	5.13	6.47
1 1/4	1 1/2		1 5/8		4.09	5.22	6. 58
1 1/2	1		1 7/8	J	4.26	5.41	6.81
1 1/2		2	2	K	4.32	5. 51	6.91
	2	 	2 1/8	L	4.40	5.59	7.01
2			2 3/8	М	4.55	5.77	7.25
		2 1/2	2 1/2	N	4.62	5.88	7.35
	2 1/2	2 1/2	2 5/8	0	4.70	5.97	7.46
2 1/2	2 1/2		2 7/8	P	4.85	6.16	7.68
2 1/2	-	3	3	Q	4.92	6.24	7.79
	3		3 1/8	R	5.00	6.35	7.90
3		 	3 1/2	S	5.23	6.62	8.23
-	3 1/2		3 5/8	T	5.31	6.72	8.34
	0 .72	4	4	U	5.53	7.00	8
	4		4 1/8	٧	5.61	7.08	8
4	1		4 1/2	W	5.83	7.37	9.11
		5	5	Х	6.14	7.74	9.55
	5		5 1/8	Υ	6.22	7.84	9.67
5			5 1/2	Z	6.44	8.12	9. 99
		6	6	AA	6.75	8.50	10.43
	6		6 1/8	BB	6.82	8.58	10.55
6			6 5/8	CC	7.13	8.96	11.75
		8	. 8	DD			<u> </u>
	8		8 1/8	EE			
8			8 5/8	FF		-	ļ. <u>.</u>
		10	10	GG			
10			10 3/4	НН		ļ	
		12	12	H		ļ	
12			12 3/4	JJ			ļ
14		14	14	KK			-
16-		16	16	LL			ļ
18		18	18	MM			
20		20	20	NN			
22		22	22	00		1	
24		24	24	PP			

- Pipe insulation is standard in 4-foot sections and includes free butt strips required for installation.
- Jacket Colors Available: Red, Blue, Yellow, Green, White.
- See the fitting cover price list for matching insulating fitting covers and in.
- For other accessories, see our Thermazip® accessories price list.



2122 West 5th Place, Tempe, Arizona 85281 • (602) 967-8888 • 1-800-922-5252 • FAX 1-602-894-6255

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

ECO B4 Sheet & of &

Location:	Fort Hunter Ligg Insulate Pipes & F		Region No. 4		Project No. 16-403-10 Fiscal Year FY96	
		B-4 (Standard Insulat	ion)			
	: March 1993		Economic Life:	15 YEARS	Preparer: KELLER & GA	NNON
1. Investment	Costs			_		
A. Construction	on Costs		\$2,794	_		
B. SIOH			\$154	_		
C. Design Co			\$168	_		
	(1A+1B+1C)		\$3,115	40		
_	alue of Existing Eq			\$0		
	ty Company Reba			\$0		
G. Total Inves	stment (1D-1E-1F)				\$3,1 15	
2. Energy Sav	vings (+)/Cost(-):			_		
Date of NISTI	R 85-3273-X Used	for Discount Factors				
Energy	Cost	Saving	Annual \$	Discount	Discounted	
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)	
A. Elec.	\$18.23	0.1	\$0.9 6	11.70	\$11	
B. Dist	\$4.98	60.6	\$301.79	13.78	 \$4,159	
C. Propane	\$7.87	39.1	\$307.72	14.16	\$4,357	
D. Demand	\$108.60	0.0	(W \$0.00	11.70	\$0	
E. Other						
F. Total			\$610	_	\$8,527	
3. Non Energ	y Savings (+) or (Cost (-):		-		
A. Annual Re	curring (±/-)		(\$70)			
	Factor (Table A)		(4+4)	11.12		
	d Savings/Cost (3	A x 3A1)		-	(\$777)	
B. Non Recur	ring Savings (+)	or Cost (-)				
ltore	Savings(+)	Year of	Discount	Doscounted	Sav-	
Item	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost		
a.						
b.						
C.				a 		
d. Total						
C Total Non B	Energy Discounted	d Savings (3A2+3Bd4)	(\$777)		
4. Simple Pay	/back 1G/(2F3+3/	A+(3Bd1/Economic Li	ife)):		5.8 Years	
	iscounted Saving			\$7	750 RECOMMEN	INEN
	Investment Ratio				2.49	لات روم
	nternal Rate of Ret			10).51%	

7. Adjusted Internal Rate of Return (AIRR):

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

ECO B4
Sheet 8 of 8

10.25%

Project No. 16-403-10 Region No. 4 Fort Hunter Liggett, California Location: Fiscal Year FY96 Project Title: Insulate Pipes & Fittings Discrete Portion Name: ECO# B-4 (Removable Type Insulation) Economic Life: 15 YEARS Preparer: KELLER & GANNON Analysis Date: June 1993 1. Investment Costs \$3,378 A. Construction Costs \$186 B. SIOH \$203 C. Design Cost \$3,766 D. Total Cost (1A+1B+1C) \$0 E. Salvage Value of Existing Equipment \$0 F. Public Utility Company Rebate G. Total Investment (1D-1E-1F) \$3,766 2. Energy Savings (+)/Cost(-): Date of NISTIR 85-3273-X Used for Discount Factors Discount Discounted Annual \$ Energy Cost Saving Factor(4) Savings(5) \$/MTBU/(1) MBTU/YR(2) Savings(3) Source \$0.96 11.70 \$11 \$18.23 0.1 A. Elec. 13.78 \$4,159 \$4.98 60.6 \$301.79 B. Dist 14.16 \$4,357 39.1 \$307.72 \$7.87 C. Propane 0.0 \$0.00 11.70 \$0 \$108.60 D. Demand E. Other \$8,527 \$610.46 F. Total 3. Non Energy Savings (+) or Cost (-): A. Annual Recurring (+/-) (\$68)11.12 (1) Discount Factor (Table A) (\$751)(2) Discounted Savings/Cost (3A x 3A1) B. Non Recurring Savings (+) or Cost (-) Doscounted Sav-Discount Year of Savings(+) **Item** Cost(-)(1) Occur. (2) Factor(3) ings(+)Cost(-)(4)\$1,883 10 0.67 \$1,262 a. b. C. \$1,262 10 d. Total \$1,883 C Total Non Energy Discounted Savings (3A2+3Bd4) \$510 NOT 5.6 Years 4. Simple Payback 1G/(2F3+3A+(3Bd1/Economic Life)): 5. Total Net Discounted Savings (2F5+3C): \$9,038 RECOMMENDED 6. Savings to Investment Ratio (SIR) 5/1G: 2.40

Keller & Gannon

Engineers-Architects

COMPUTED BY REV. 19-12	TOTE WERE HALLED DESERT	PROJECT 102-102 SHEET NO. 1 OF 6 SHEETS

DESCRIPTION OF ACTION

Reducing the hot water supply temperature by adjusting hot water boiler set points reduces conduction losses from piping and slightly improves boiler performance. Control retro fits consist of differential temperature controllers that adjust hot water boiler set points proportionally in the range of 200° fto 180° f when outside air temperatures are between 40° f and 65° f. Existing heating hit water supply temperatures are used when outside air temperatures are used when outside air temperatures are below 40° f. No heating is allowed for outside air temperatures are below 40° f. No heating is allowed for outside air temperatures are

FACILITIES INCLUDED

All buildings herted using hot water boilers are considered.

ENERGY SAVING CALCULATIONS

BOILER PERFORMANCE IMPROVEMENT

FORMULA to calculate that Transfer, comb.

Gasses to circ Heating Hot water in Boiler

Tubes: $k = f(BTU/\Delta T - inch - saft)$

Keller & Gannon

Engineers-Architects

COMPUTED BY RIE	まななから	PROJECT 16-403-10
CHECKED BY 6117 DATE NINGCH 1973	PUTSIDE AIRTEMPERATURE	- FIRTH
REV 19	PESIE!	SHEET NO. 2 OF 6 SHEETS

Lowering HHW Temp. will result in the same boiler k: $k_1 = k_2$ since thickness (inches) and area (se FT) remain lonstant, thus

BTUH 2 $/ \Delta T_2 = BTOH_1 / \Delta T_1$

 $BTOH_2 = (\Delta T_2/\Delta T_1)$ BTOH,

represents increased heat trunsfer efficiency.

where: $\Delta T_1 = 750^{\circ}F - \left\{\frac{200 + 180}{2}\right\} = 560^{\circ}F$ $\Delta T_2 = 750^{\circ}F - \left\{\frac{180 + 160}{2}\right\} = 580^{\circ}F$

AT, = Comb. temp. less HHW Aug Temp. (200°F Suppy, 180°F Return assumed 20°F AT HHW)

AT2 = Same as AT, except reduced to 180°F Supply \$ 160°F Return.

NOTE: RETURN TEMP MINIMUM 160°F TO PREVENT CONDENSING IN BOKER.

AUG. TEMP IN BER 750°F.

BTUH 2 = 580/560 BTUH, = 1.0357 =>

3.57% efficiency improvement @ 65°F OSA.

AUG, EFF. IM PROVEMENT:

3.57 x DEG HRS. BETWEEN 40465°F

DEL HRS BELOW 65°F

Keller & Gannon

Engineers-Architects

COMPUTED BY RIE	FC5" D-5"	PROJECT 16-403-10
CHECKED BY SIT 1913	OUTSIDE AIR TEMPERATURE	
REV19	VESIE!	SHEET NO. 2 OF 6 SHEETS

Lowering HHW Temp. will result in the same boiler k: $k_1 = K_2$ since thickness (inches) and area (so FT) remain constant, thus $\frac{BTUH_2}{\Delta T_2} = \frac{BTUH_1}{\Delta T_1}$

 $BTOH_2 = (\Delta T_2/\Delta T_1)$ BTOH,

represents increased heat transfer efficiency.

where: $\Delta T_i = 750^{\circ}F - \left\{ \frac{200 + 180}{5} \right\} = 560^{\circ}F$

 $\Delta T_2 = 750^{\circ}F - \left\{ \frac{180 + 160}{2} \right\} = 580^{\circ}F$

AT, = Comb. temp. less HHW Aug Temp. (200°F Suppy, 180°F Return assumed 20°F AT HHW)

AT2 = Same as AT, except reduced to 180°F Supply \$ 160°F Return.

NOTE: RETURN TEMP MINIMUM 160°F TO PREVENT CONDENSING IN BOKER.

AUG. TEMP IN BLR 750°F.

BTUH 2 = 580/560 BTUH, = 1.0357 =>

3,57% efficiency improvement @ 65°F OSA.

AUG, EFF. IM PROVEMENT:

3.57 x DEG HRS BETWEEN 404650=

Keller & Gannon

Engineers-Architects

SHEETS

COMPUTED BY 213	FUOT Bris	PROJECT 16-405-10
DATE 192 REV. 19	AA TEMPERATURE PASET	SHEET NO. 3 OF 6 SHEE

CONDUCTION LOSSES

200° F 2"\$, 2" INSUCATION 180 BTUH / 10 LF 180°F ----- N ----160 160°F ----- "----120 SAVINGS: /- [(180-120)] = 33% of conduction losses after other insulation retrolits, no more than 1% of border efficiency involves conduction losses,

OF H COST

2 MH /YR / CONTROL SYSTEM & MECHANICARL - HEATING Allow @\$3.54/ HR = \$7.08 MR

Keller & Gannon

Engineers-Architects

COMPUTED BY \$13	Eco# 3-5	PROJECT 16-403-10
DATE MARCH 1993	COTSIDE AIRTEMY RESET	PHUERITE
REV19	FHERAY SAVINGS CALLS	SHEET NO. 4 OF 6 SHEETS

ALL BUILDINGS EXAMINED CURRENTLY HAVE OUTSIDE MR TEMPERATURE RESET CONTROL ON HOT NATER BOILERS WITH THE EXCEPTION OF BUILDING 101.

BL09 101

BOILER SOE = 300 KBTUH

SAVITAS:

ANG EFFICIENCY IMPROVEMENT = 3.57 x \$161 96632

> = 0.19% + 0.33% cotourtal Loss 0.52%

CURRENT BOILER EFFICIENCY = 67.9% EFFICIENCY H/RW: = 68.42%

11HPUT BTUIT: 300 - 300 : 3.34 14374 0.679 0.6842

3.30 1CBTUX 96632 OH / (70-24) = 7 MBTU/TR

7 MBTU /12x \$4.98/12 = \$35/TR

@ 15 TRS (UPN = 11.12) TOTAL SAVINED = \$389

CONSTRUCTION COST EST	MAT	E		Pebruary	1993	Sheet & Of	6
Project EEAP Limited Energy Study	-			Project No. 16-403-10	Basis for 6	Estimate (no design comp	adarl)
Location Fort Hunter-Liggett, California Engineer-Architect		····				(no design comp	, , , , , , , , , , , , , , , , , , ,
Keller & Gannon					<u> </u>		
Drawing No.		Estimate			Checked i	sy BIH	
0#-B5 (Outside Air Temperature Reset) RJB		Labor	- N				
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Controller	1	EA	\$39	\$39	\$450	\$450	\$489
Controller		EA	\$39	\$39	V.00	- 4 .55	\$39
Remove Old Control	1		\$150	\$150	\$30	\$30	\$180
Wiring	1_	Lot	\$150	9150	455	400	\$708
Subtotal					-		\$57
Sales Tax @ 8%					 		\$765
Subtotal Substitution Class Profit Class Conference Class Profit Class Conference Class Conference					 		\$229
Contractor OH & Profit @ 30%							\$994
Subtotal							\$10
Bond @ 1%					-		\$1,004
Subtotal 9 1000							\$1,004
Estimating Contingency @ 10%			-		 		\$1,104
Total Probable Construction Cost							Ψ1,104
					 		
					-		
					 		
							
4							
K.							
Te mail							
**							

A Revenue

Life Cycle Cost Analysis Summary ECO B-5 Energy Conservation Investment Program (ECIP) Sheet 6 of 6

Discrete Porti	Fort Hunter Ligge Install Outside Air 1 on Name: ECO# B : March 1993	emperature Reset	Region No. 4 Economic Life:	15	YEARS	Project No. 16-403-10 Fiscal Year FY96 Preparer: KELLER & GANNON
E. Salvage Va F. Public Utili	on Costs	•	\$1,104 \$61 \$66 \$1,231	- - -		- - \$1,231
2. Energy Sar	vings (+)/Cost(-):	or Discount Factors Saving MBTU/YR(2)	Annual \$ Savings(3)	-	Discount Factor(4) 11.70	Discounted Savings(5) \$0
B. Dist C. Propane D. Other E. Demand S F. Total	\$4.98 \$7.87	7 	\$35 \$0 \$35	B ver	13.78 14.16	\$480 \$0 \$480
(2) Discounte B. Non Recur	Factor (Table A) d Savings/Cost (3A ring Savings (+) or	Cost (-)	(\$7)	•	11.12 Doscounted Sav-	(\$78)
a. b. c. d. Total	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)	Name (ings(+)Cost(-)(4)	· .
4. Simple Pay 5. Total Net D 6. Savings to	•	SIR) 5/1G:	•		(\$78) 44.2 \$403 0.33 -11.17%	Years

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY THE PROPERTY OF TH	PROJECT_16-403-10
COMPUTED BY P.TB/BIH CHECKED BY BIH/RIB TUSTOUR TIME CLOSUS OF	PHL-EBAP
DATE HARCH 1993 INSTALL TIME CLOCKS OR REV	SHEET NOOFSHEETS
REV	
DESCRIPTION OF ACTION	
Install programmable T-St	ats or 7-day,
24- hour time clocks to con	HOOL HVAC
systems in selected built	dings.
- A What cinullanous	houting and
- Assure that simultaneous	The state of the s
cooling do not occur and	provide a
dead-band between hea	trong and
- 1- 1- 1- Louis Louisons	Lines
cooling set point temperat	O/es,
Cilibra Tradit-d	
	}
Facilities Included	
Pacar to affacted spreads he	est printouts
Refor to attached spreads he	eet printouts
Recor to attached spreads he	eet printouts:
Recar to attached spreads he Energy Saving Calculations	
Perar to attached spreads he Energy Saving Calculations	
Energy Saving Calculations Two categories of calculations	are usad:
Energy Saving Calculations Two categories of calculations	are used:
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy	are used:
Every Saving Calculations Every Saving Calculations Two categories of calculations Boildings whose HVAC everyy simulated using Trace by	are used: use are
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy simulated using Trace by	are used: use are
Every Saving Calculations Everyy Saving Calculations Two categories of calculations Boildthys whose HVAC everyy simulated using Trace by program wave re-ron	are used: nse are compalor unth revised
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy simulated using Trace by	are used: use are compalor use the revised:
Refor to affactual spreads the Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy simulated using Trace be program were re-run temperature schodules.	are used: use are compalor useth revised: and lock outs
Every Saving Calculations Every Saving Calculations Two categories of calculations Boildthy whose HVAC everyy simulated using Trace by program wave re-ron	are used: use are compalor useth revised: and lock outs
Every Saving Calculations Everyy Saving Calculations Two categories of calculations Boildthys whose HVAC everyy simulated using Trace by program were re-ron temperature schodules a of simultaneous heating	are used: nse are n
Energy Saving Calculations Energy Saving Calculations Two categories of calculations Boildity whose HVAC energy simulated using Trace by program were re-ron temperature schadules a coloring boilding energy Remaining boilding energy	are used: nse are n
Energy Saving Calculations Energy Saving Calculations Two categories of calculations Boildity whose HVAC energy simulated using Trace by program were re-ron temperature schadules a coloring boilding energy Remaining boilding energy	are used: nse are n
Energy Saving Calculations Energy Saving Calculations Two categories of calculations Boilding whose HVAC enorgy simulated using Trace by program were re-ron temperature schodules a of simultaneous heating Remaining building energy s determined based on	are used: use are worth revised: and lock outs avings were baseline.
Energy Saving Calculations Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy simulated using Trace by program were re-ron temperature schodules a of simultaneous heating Lemaining building energy s determined based on	are used: use are worth revised: and lock outs avings were baseline.
Energy Saving Calculations Energy Saving Calculations Two categories of calculations Boildthys whose HVAC energy simulated using Trace by program wave re-ron temperature schadules a of simultaneous heating Lemaining building energy s determined based on HVAC energy use estim	are used: use are use the revised: unth revised: and coaling: avings were baseline:
Energy Saving Calculations Two categories of calculations Boildings whose HVAC energy simulated using Trace by program were re-ron temperature schoolules a containing boilding energy kemaining boilding energy the containing boilding energy by a containing boilding energy down by the vatio of for	are usad: use are worth revised: and lock outs avings were baseline netes factored 11-load-hours
Energy Saving Calculations Two categories of calculations Boildthips whose HVAC enorgy simulated using Trace by program wave re-ron temperature schadules of simulation boilding energy determined based on HVAC energy use estim	are usad: use are worth revised: and lock outs avings were baseline netes factored 11-load-hours

FORM 101-1/8

Keller & Gannon

Engineers-Architects

COMPUTED BY CHECKED BY SITT	1913 14517	60 B-6/	245
REV		TRACE 600	SCIPILATA S SILLE III
- BUILOIHA		LY SUIFFOU	LE SYSTEM NODEL
- 46 **	HE	occupinter	
	0-60	40	AR COHOMOTER WITH
	6-20	155	DOMESTIC PROPRIE FIRED
	20-0	40	FIRAME: 23.5 MRHCLIG/58 MDH
= 51.44	0-6	40	2X PACKHERY, 140002
	6-20	TES	TESTIMENT AND CONTINUES
	20.0	40	WITH DOMESTIC TRAPHITE FIRED
	, and program a suprime dependent of the		FLIRHICE FIRM 21.2 MISH COHY
	and the second second		38 MCH HEATTH
128 **	0=11	YES	THO PIPE FITH COIL CHAISCI
	11-13	40	PER ROOM), COOLING PREVIDED
	13-18	YES	BY (1) 280 MBH RIZCIPRECITIVE
	18-20	HO	CHILER, HEATH TROUPED
	20-0	405	SY (1) 288 MBH PROPARE
,	Marie A. 1982 Sandin and Water S. Sen. 1	/ Pro	TIREDILATER HETTER
	LEFKT	>A-Y	
	0-9	H0	(1) PACKAGED ELECTRIC
	9-17	YES	CORES GAS HEIFTHA
	7-24	Ho.	-CIH17
		CENTO .	
	OFF		
132	- WEEK	-DAY	
	0-9	- No	(D) PACKIFIED, 1200FTOP
	9=17	YF25	ELECTRIC COX/GAS STEAT
	17-24	NO -	WHAT CUMPERS IS TOMS
	1) SEN	L EHO	
	oe	'	
:			

Keller & Gannon

Engineers-Architects

CHECKED BY TELE	•		PROJECT 10-405-10
DATE_FPB	1973 1457	ALL TIME	5. CLOULS
REV	- 19_ TEXCE	E 600 AGA	MATURES CONTINUED NO. 3 OF 15 SHEETS
- BUILDING	OCCUP	HUT SCH	HEIZULE STSTEM MODEL
	itre	accupante	. 🛫
290	LEEK		CIT SIHALE COTE SYSTEM
		40	COULD BY 25 TOH TERE
		Y25	CHILLES HAD HEATED D
	17-0	***	816 MBH GAS FRED HOT
		r end_	LATER HEATER. (3) L.
			TOU PHEKMED UNIS; CI)
			UHT HEMME
295 +4.	0=11	YES.	(1) FAT COIL SYSTEM (TP
	1-13	110	ROOM) COOLED BY (1)
	13=18	YES	54 TON AIR COLETS RECO
	18-20	HO	CHILLER MAD HEATED ISY
	20-24	TES	U) 2600 MBH GHS FIRE
			HOT ILATIES HEATER
<u> </u>			
301744	LEEKTH	4	
	<u>o-</u> 8		(1) MULTIECHE SISTEM
		455	COOLED BY CO 145 MISH
	8-20		
	20-24	Ho	
	20-24		AVIZ COLLED WHOERSEIZ
	20-24	HO	HEATED BY CO 137 MIGH
	20-24 Upp	HO	HEATED BY CO 137 MIGH
	20-24 Upp	HO	HETTED BY CO 137 MIST
	20-24 Upp	HO	AND COLLED WHOETSEIZ/ HETTED BY (1) 137 MIGH GAS FURTALE SEVERIL COMPUTED RUMATIL
	20-24 Upp	HO	AND COOLED WHOETSEIZ! HETTED BY CO 137 MISH GAS FURTALE SEVERITE CONTRUPEZ ROSMATTE CONTRIBITIONALLY CHAPS HISTORY
Y Para	20-24 USF	HO KEAD F	AND COOLED WHOLESELD! HEATTED BY CO 137 MISH GAS FURTALE SEVERITE CONTRIPED ROOM ATTE
** PAG	20-24 USF OF FEC	HO EERID F	AND COOLED WHO FIRE ?! HETTED BY (1) 137 MIGH GAS FURTHER SEVERITE COTION TERE RUSTING CONTINHENT WHO THE HEAT
** PATES	20-24 USF OF FEC	HO EERID F	AND COOLED WHOERSEIZ/T HEHTED BY CO 137 MIGHT GAS FURTALE SEVERITE CONTRUPEZ ROOM ATTE CONTRUPEZ ROOM ATTE
	20-24 USF OF FEC	HO EERID F	AND COOLED WHOLESENDY HETTED BY CO 137 MIGH GAS FURTHER SEVERIT COTTONING RUNTATION CONTINUENTY WHO THE HEATT
	20-24 1156 08 124162	HO EERID F	AND COOLED WHOLESENDY HETTED BY CU 137 MIGH GAS FURTHER SEVERIT COTTONING RUNTATION CONTINUENTY WHO THE HEATT
	20-24 1156 08 124162	HO EERID F	AND COOLED WHOLESENDY HETTED BY CU 137 MIGH GAS FURTHER SEVERIT COTTONING RUNTATION CONTINUENTY WHO THE HEATT
	20-24 1156 08 124162	HO EERID F	AND COOLED WHO FISHED BY CO) 137 MISH GAS FURTHER SEVERITE CONTINUED RUMANTE CONTINUED RUMANTE COOLING MAD REPORT
	20-24 USE OF FECA 1PUTENZ PAY	HO EERID F	AND COOLED WHO FISHED BY CO) 137 MISH GAS FURTHER SEVERITE CONTINUED RUMANTE CONTINUED RUMANTE COOLING MAD REPORT

FORM 101-1/8

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY 72 173	Eco#3-617	PROJECT 16-403-10
CHECKED BY PIH	POMOR ANIMITSUE TESTIT	
DATE19_15	TRACE 600 ASSUMMONS	SHEET NO. 4 OF 15 SHEETS
REV 19	PACE GOD ASSOCIATIONS	

REV.			_ 19	CATCE COLO	ASSAMMINES JUILLING
BU	AILDIH		TATS	CHEPUE	SYSTEM MODEL
	46	H2	479	CL 4	PACKAGED, 1HD0012 TERMIHAL
		5-6		88	HE COHPTIONER WITH POTTE
		6-20		78	PREPARE FRED FURHICE
		20-0		88	28.5 MISH COULING /58 MIBH HE
			, ,		
	51	0-6	55	38	2X ACKHED, IHOOR TERMIN
		6-20	68	つる	ALE COHDITIONER LITT DUMES
-		20-12	55	200	PROPRIETE FIRE FUEL FLEE ETE
		··		5 –	21.2 MBH COOLING / 38 MBH HEAT
				38	(1) PACKMED ELECTRIC COLETS/0
		0=8		_	HEAT CHIT CUHDER 20 TOHS) IT
			55		ELECTRIC COSETO/ELECTRIC HEAT
		11:0	55	5 .0	HALL AC LIHAT CLIHARIZ 11 TOHSI
-		1188	Kont		
	128		15	73	TIO PIPE PHY COIL WHITS COM
			55	•	PER ROOM). COOLING PROVIDED
			65	33	BY (1) 230 MBH MECHPROCHTIFE
			255	38	CHILER, HEATHA PROVIDED B
		-	65		(i) 288 MBH PROPRITE FIRED
			er eito		HATER HEATTER
			65	A -	
			ZKAAT		
	אאררו	0-9	55	88	(1) ACCEPTED ELECTRIC COUNTED (A
		9-17	65	78	HEAT WHAT
		17-0	55	38	
		LE	ECEND		
		0-29	55		CIT PACKAGED, ROOFTOP ELECTE
	182 XX	0-9	53	88	COOLED / GAS HEAT WHIT
-	100	9-1	65	78	COMPRE STATE
		77-2	च <u> </u>	_38	
					2 - 2 -
					+co b- L

COMPUTATION SHEET

Engineers-Architects

	COMPUTED BY RUT	31	Eco"	B-61	7	PROJECT		<u>ට</u>
	CHECKED BY BIH	165	PRUARITIM	LITBLE T	1-517		EVA	
	REV.	19			TICE SHOPE	SHEET NO5	_OF_15	SHEETS
	BULLDING	Ties	SHEDL	14	5757	EM MC	XXIL.	
			EEK DAY	2.00	المعطودة	SHC5 SU	SKETER	
	ZAOXX	HZ	154	UG 38		ist is t		
		0-9	55	38 78		is the him		
		4-17	65	10 32		D IFL HAM		
		17-0	55			ot prekt		
		·	Jeeke Ho		- •	THENT		W 3) .
		5-24	55	38	را) دال	1 1727111	~ (C.	
		1.	leek Dit					
	<u> </u>	0-9	55	38	(1) OHE	Fin Co	or And	2
		9=17	65	78	a) Paren	LICHED TO	ERMIHIT	<u> </u>
		17-0	55	33	AIR CO	エシドリエの	r_w	JEV)
			LEEKET	fo	BY ME	, costa >	CONTOR	15হ্ন
		0-24	55	88	きる一方	AMOD BY	240	MBH
					STEAT	1301 LVE	١٤	
			IFEC DAY	7		•		
	13-18	0-11	65.	38	(1) Firt	6016 STS	TEFT LI	PERL
		11-13	55	73	1200m)	COOLFED	B.T	54_
		13-18	65	73	TOAR	court	CECIP (Athle
		13-20		78	VHD IN	EATED 1	54.1,2	600
		20-24	65	38	MIBH C	its Fire	10 Ho	T
			HERK EH	h>	MARIS	HEATE	2	
		0-24	_65_	18_				
					<u></u>			
				· ·	-650	E+Z-/		
	7.7.	COHSID	fred A	2_raka		0:0-		
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			and the same of th					
			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		St. A.	e dis.		
FORM 101-1/8			<u></u>		* -	5 51	03-	1 ——
				-				
	E :							

OMPL	JTATION	SHEET	

Engineers-Architects

CHECKED BY 3H	ELO 3-011	PROJECT_10
CHECKED BY 1913	PROGRAMMABLE T-STAT	
	1	SHEET NO. 51 OF 15 SHEETS
ASSUME (1) HITH ANHUM TO ALL FHO THERMOSTI 1 SESSION	ANHUAL DIMITERINA INSTRUCTION TO MINING TRANSPORTS. A HRST @ \$3000/H LETINA \$10000/TR,15 TRS	323510H MICMOHS RAMMARUE 12 = \$32000 = \$1,1120044
	· · · · · · · · · · · ·	1,432-22
	TZOU	HDEO 1,40000
- FIHCUUDES	TRAVEL	
HISTIZ	35-3275-X @ 4%	15-11.12
TO BU	ASSUME TRAINING	PER ZD:
		PER STAT
		FOR TRAIDIOS
		ECO 3-7/6
		100 D- 1/6

RM 101-1/8

Eco 86/7 Sheet 6 of 15

Fac		Existing Schedule	Γ	Heating Season		Cooling	Degree Hou	Degree Hours per Year,	7 Days/Wk			FULL LOAD HOURS/YEAR	URS/YEAR 1
Š	Installation Name	Time	9	Setboint	ž	Setboint	Heating	Heating		Total	Total	Heating	Cooling
		HVAC ON	HVAC OF	Deg		Deg	ŏ		7 Day/Wk	Heating	Cooling	FLHr/Yr	FLHr/Yr
9	Family Housing NCO & Eni	909	2200	R	35	72	68,087	il	44,615	93,192	21,833	1,480	728
P 41A	Family Housing NCO & Enl	9		2	55	72	280'89	_	44,615	93,192	21,833	1,480	728
P 41B	Family Housing NCO & Enl												
P 42A	Family Housing NCO & Enl	009	2200	70	22	72	280'89	25,104	44,615	93,192	21,833	1,480	728
P 42B	Family Housing NCO & Ent												
P 43A	Family Housing NCO & En	8	8 200 200	2	SS.	72	68,087	25,104	44,615	93,192	21,833	1,480	728
P 43B	Family Housing NCO & Enl												
P 44A	Family Housing NCO & Enl	8	88 88 88	2	52	22	280'89	25,104	44,615	93,192	21,833	1,480	728
P 44B	Family Housing NCO & Enf												
P 45A	Family Housing NCO & Ent	8	88	2	32	72	280'89	25,104	44,615	93,192	21,833	1,480	728
P 45B	Family Housing NCO & Eni												
P 46	Family Housing CG & WO	009	2200	22	55	72	68,087	25,104	44,615	93,192	21,833	1,480	728
P 47	Family Housing CG & WO	900	2200	70	55	72	68,087	25,104	44,615	93,192	21,833	1,480	728
P 51A	Family Housing NCO & Ent	009	2200	20	22	72	28'082	25,104	44,615	93,192	21,833	1,480	728
P 51B	Family Housing NCO & Eni												
P 52A	Family Housing NCO & Enl	009	2200	20	55	72	280'89	25,104	44,615	93,192	21,833	1,480	728
P 52B	Family Housing NCO & Enl												
P 53	Family Housing CG & WO	009	2200	70	22	72	28'082	25,104	44,615	93,192	21,833	1,480	728
P 54	Family Housing CG & WO	009	2200	70	55	72	280'89	25,104	44,615	93,192	21,833	1,480	728
P 55	Family Housing CG & WO	009	2200	0.2	55	72	68,087	25,104	44,615	93,192	21,833	1,480	728
P 56	Family Housing CG & WO	900	2200	02	55	72	68,087	25,104	44,615	93,192	21,833	1,480	728
P 57	Family Housing CG & WO	9	2200	20	55	72	280'89	25,104	44,615	93,192	21,833	1,480	728
P 58	Family Housing CG & WO	009	2200	20	55	72	68,087	25,104	44,615	93,192	21,833	1,480	728
P 59	Family Housing CG & WO	900	2200	02	55	72	68,087	25,104	44,615	93,192	21,833	1,480	728
P 60	Family Housing CG & WO	009	2200	2	55	72	68,087	25,104	<u>L</u>	93,192	21,833	1,480	728
S 79	Post Office, Main	006	1700	જ	55	72	14,071	40,610		53,242	18,106	436	517
P 80	Exchange, Main Retail	006	1700	89	55	72	18,715	40,610		59,325	18,106	425	604
P 8-1	Theater with Dressing Rm's	1600	2300	8	55	72	19,809	5,000	5,161	13,581	9,650	277	138
P 101	Open Din Cons (Hacienda)	901	1600	20	55	72	14,616	42,688	44,615	57,304	15,420	318	514
	Club (Berr)	1600	2200	2	33	72	21,855	40,134	44,615	61,989	9,650	475	322
	Hacienda, East Rooms	1700	8	2	32	¥	98,616	7,025	44,615	105,641	ž	2,144	0
	Hacienda, West Rooms										-		
P 116	Exchange Service Station	009	1900	8	40	Y.	26,821	3,537	5,161	30,357	¥.	745	0
	(Non-shop areas)	99	1900	88	₽	72	47,065	3,537	5,161	50,602	21,102	1,070	703
T 120	Fire Station - Office	8	2200	8	55	72	60,015	25,104	44,615	85,120	21,833	1,364	728
	Fire Station - Dorm												
	Fire Station - Garage					i							
T 121	Bowling Center	8		8	55	72	42,842	33,140	44,615	67,020	21,833	911	250
T 124	Family Housing LC & MJ	<u>8</u>		20	55	72	280'89	25,104	44,615	93,192	21,833	1,480	728
T 127	Officers Quarters Military	009	2200	89	22	72	60,015	25,104	44,615	85,120	21,833	1,364	728
P 128	Officers Quarters Military	900	ŀ	89	55	72	60,015	25,104	44,615	85,120	21,833	1,364	728
T 131	Family Housing CG & WO	900		02	55	72	68,087	25,104	44,615	93,192	21,833	1,480	728
S 144	Gymnaelum	Not in Use		Not in Use				Not in Use					
S 146	FE Facility	700		જ	40	78	10,781	3,537	5,161	11,702	9,003	281	268
T 149	Family Housing NCO & Enl	900	2200	02	35	22	68,087	25,104	Ľ	93,192	21,833	1,480	728
T 156	FE Facility - Shop	8	l	જ	\$	78	10,781	3,537	L	11,702	9,003	281	568

-Bc		Existing S	Schedule	Heating Season	eason	Cooling	Degree Ho	Degree Hours per Year,	7 Days/Wi)		FULL LOAD HOURS/YEAR	JURS/YEAR
ġ	Installation Name	Time	Time	Setpoint	Setback	Setpoint	Heating	Heating			Total	Heating	Cooling
		HVAC ON	HVAC ON HVAC OF	Peg	Deg F	Deg F	8	Set-Back	7 Day/Wk	Heating	Cooling	FLHr/Yr	FLHr/Yr
-+	FE Facility - Office												
┪	Venicie Storage	Not in Use	1	Not in Use				Not in Use					
_	Admin General Purpose	700	Į	89	55	72	33,064	33,833	44,615	60,531	15,420	756	367
7	Elec Maint. Shop	700	Ì	88	55	72	33,064	33,833	44,615	60,531	15,420	156	367
-1	Officers Quarters Military	700		89	55	72	33,064	33,833	44,615	60,531	15,420	95/	367
	Admin General Purpose	700		88	55	72	33,064	33,833	44,615	60,531	15,420	756	2967
	Admin General Purpose	700		89	55	72	33,064	33,833	44,615	60,531	15,420	756	367
	Officers Quarters Military	200		89	55	72	33,064	33,833	44,615	60,531	15,420	756	2967
L 167	Officers Quarters Military	200	1600	88	જ	72	33,064	33,833	44,615	60,531	15,420	756	367
	General Purp Warehouse	700	1600	88	જ	72	33,064	33,833	44,615	44,615	15,420	0	0
	Cold Storage Warehouse	¥		¥	ž	¥	•			•	٠	•	•
	Technical Library	700	1600	88	જ	72	33,064	33,833	44,615	60,531	15,420	756	367
_	Child Development Cntr	009		72	55	72	26,886	29,446	44,615	74,412	19,953	1,022	475
	Commissary	006		88	55	72	18,715	40,610	44,615	55,122	18,106	568	431
S 186	Sup Svc Admin Bidg	200	1600	88	55	72	33,064	33,833	44,615	60,531	15,420	756	367
P 190	Post Chapel	009	1900	2	જ	72	53,500	59,096	44,615	82,596	21,102	1,163	703
8 197	Admin Bldg R&D - Office	200	1600	88	55	72	33,064	33,833	44,615	60,531	15,420	756	367
	Admin Bidg R&D - Electronics	0	2400	8	88	22	115,562	0	•	115,562	21,833	2,626	728
-	General Inst Bldg	800	1800	88	\$	72	27,529	3,537	5,161	19,963	19,953	392	380
P 205 /	Admin General Purpose	909	2200	88	53	72	60,015	25,104	44,615	73,547	21,833	1,137	520
_	Company HQ Bullding												
 208 	Enlisted Pers Dining Fac Kitchen Ares - Scullery	0	2400	89	89	22	115,562	0	0	115,562	21,833	2,626	728
P 207	Eni Berracks w/o Dining	009	2000	89	55	2	60 015	25 104	44 61E	85 120	21 833	1 36.4	200
_	Company HQ Bullding	3	3	}	3	1	2	5) 	3,130	28,13	<u>.</u>	07/
P 208	Eni Barracks w/o Dining	909	2200	88	ક્ક	22	60,015	25,104	44,615	85,120	21,833	1,364	728
_	Company HQ Building												
-	AAFES Snack Bar	009	1600	88	55	72	41,952	29,585	44,615	71,537	15,420	ES6	514
┪	Hith/Driti Clinic w/ Beds	0	2400	89	89	72	115,562	0	0	115,562	21,833	2,626	728
-	Outdoor Swimming Pool	Ν			ΑN			Ϋ́			A'A	4	NA
-1	Gymnasium	1000		65	040	72	18,590	5,161	5,161	23,751	21,833	453	728
7	Physical Fitness Center	- 000 000	2100	හි	40	72	18,590	5,161	5,161	23,751	21,833	453	728
P 229	Eni Barracka w/o Dining	8		8	92	72	60,015	25,104	44,615	85,120	21,833	1,364	728
0000		900	0000	5	i.	Î							
	Company HQ Building	3	3	8	ត្ត	2/	c [0]	25,104	44,615	85,128	21,833	1,364	728
S 235	Admin General Purpose	700	1700	88	55	72	33,064	33,833	44,615	60,531	15,420	756	367
S 236	Admin General Purpose	200		89	55	72	33,064	33,833	44,615	60,531	15,420	756	367
┪	Admin General Purpose	700		89	99	72	33,064	33,833	44,615	60,531	15,420	756	292
	Sig Photo Lab Process	200	1700	89	92	72	33,064	33,833	44,615	60,531	15,420	756	367
P 240	Admin General Purpose	700	1700	88	55	72	33.064	33,833	44.615	60.531	15.420	756	367
+	OM Facility	25	4700	03	32	1	2000	000	200	200	20, 21	250	000
		3		8	8	2	80,58 80,000		44,613 CTO,44	<u>8</u>	15,420	8	/96
S 243 /	Admin General Purpose	700	1700	89	55	72	33,064	33,833	44,615	60,531	15,420	756	367
3244	Admin General Purpose	8		8	99	72	33,064			_	15,420	95/	367
		1				ı	•	_			ı		

3		Existing St	Schedule	Heating Season	9ason	Cooling	Degree H	Degree Hours per Year, 7 Days/WI	7 Days/Wk			FULL LOAD HOURS/YEAR	OURS/YEAR
ż	Installation Name	Time	Time	Setpoint	Setback	Setpoint	Heating	Heating	Htg Setbk	Total	Total	Heating	Cooling
		HVAC ON	HVAC OF	Deg F	Deg F	Deg F	ŏ	Set-Back	7 Day/Wk	Heating	Cooling	FLHr/Yr	FLHr/Yr
\$ 246	Admin General Purpose	200	1700	88	55	72	33,064	33,833	44,615	60,531	15,420	756	292
\$ 247	Admin General Purpose	200	1700	8	55	72	33,064	33,833	44,615	60,531	15,420	756	367
P 252	_	9	1600	8	45	72	34,454	3,537	44,615	39,883	15,420	929 925	367
P 258	+	98	1600	æ	45	72	34,454	3,537	44,615	39,883	15,420	625	367
P 259	•	8	1600	જ્	45	72	34,454	3,537	44,815	39,883	15,420	625	367
S 283	FE Maintenance Shop	700	1700	8	Q *	22	10,781	4,287	5,161	12,238	15,420	288	196
\$ 286	Admin General Purpose	200	1600	88	જ	22	33,064	33,833	44,615	60,531	15,420	992	367
P 287	Recreation Building	1200	2100	88	55	72	18,027	41,783	44,615	59,809	20,692	410	069
\$ 288	_	002	1600	88	જ	72	33,064	33,833	44,615	60,531	15,420	756	296
\$ 290	Electron Equip Facility	700	1600	8	52	72	33,064	33,833	44,615	60,531	15,420	992	367
S 291	Cont Humid Warehouse	200	1600	88	55	72	33,064	33,833	44,615	60,531	15,420	756	367
P 295	Eni Berrecks w/o Dining	900	2200	8	જ	22	60,015	25,104	44,615	85,120	21,833	1,364	728
P 301	ADP Building Office	900	1600	88	55	22	33,064	33,833	44,615	60,531	15,420	756	367
	Computer Room	0	2400	3	8	2	115,562	0	0	115,562	17,007	2,628	607
642	P 642 Detached Latrine/Shower	≨	¥	₹	₹	ž	ž	¥Z	¥.	¥	¥	¥Z	¥N.
2201	8 2201 Control Tower - Range SPT	15 d/y Jar	an & Jul	85	OFF	72	5,137	0	0	5,137	1,610	125	\$
l otals													

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Heath Heat	Fac	ECO B6/B7	ECO B6/B7 Energy Savings	8	IECO B6/B7 Enera	7 Energy Co	v Cost Savings		Non-Energy Saving	Г	Construction Cost	on Cost				I ifa Cycle Cost Apalysis	net Analysis	
Mainton Main	ō.	Electric	Propene	ı	Electric	Propane	Fuel Oil	+-	Non-Eav	Q	Bare	Constr	Total	PG&E	Total	CC N=15	Simole	
1. 1. 1. 1. 1. 1. 1. 1.		kWH/Yr	MII BTU/Yr	MII BTU/Yr	\$/Year	\$/Year	\$/Year		Σ,	\$ Total	Ö	Cost	Cost	Rebate	Invest	Savings	Pavback	SIR
10 10 11 12 12 13 10 14 15 15 15 15 15 15 15		839	14.7	0.0	\$ 63	\$118	0 \$	\$178	(\$\$)	(\$67)	\$137	\$214	\$238	\$45	\$193	\$2,302	1.12	11.913
Color Colo	₹ 8	532	2.7	0.0	7	\$21	9	\$61	(\$1)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$753	6.45	1.948
Color Colo	¥ 88	618	3.1	0.0	\$48	\$24	%	\$70	(15)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$876	5.54	2.267
10 10 10 10 10 10 10 10	38	618	3.1	0.0	37	\$24	0\$	\$70	(\$3)	(\$7)	\$274	\$427	77.22	06\$	\$387	\$876	5.54	2.267
1	₹ ₽	818	3.1	0.0	\$\$ \$	\$24	9	\$70	(\$1)	(\$7)	\$274	\$427	\$477	08\$	\$387	\$878	5.54	2.267
1	45 88 88	818	3.1	0.0	22	\$24	0\$	\$70	(\$1)	(\$7)	\$274	\$427	\$477	08\$	\$387	\$878	5.54	2.267
State Stat	9	522	2.9	0.0	\$ 38	\$23	%	\$82	(\$6)	(\$87)	\$137	\$214	\$238	\$45	\$193	\$715	3.46	3.698
1	7	522	2.9	0.0	\$30	\$23	8	\$62	(\$\$)	(\$67)	\$137	\$214	\$238	\$45	\$193	\$715	3.46	3.698
1	1¥ 18	618	9.1	0.0	ĩ	\$ 54	9	\$70	(\$1)	(2\$)	\$274	\$427	4477	08\$	\$387	\$876	5.54	2.267
Secondary Color Secondary	2A 2B	618	3.1	0.0	\$	\$24	S,	\$70	(15)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$878	5.54	2.267
0.22 2.0 0.00 \$39 \$23 \$40 (867) (867) \$817 \$214 \$229 \$45 \$119 \$214 \$229 \$45 \$119 \$410 \$41		522	2.9	0.0	\$39	\$23	9	\$82	(88)	(\$87)	\$137	\$214	\$238	24.5	\$183	\$715	3.48	3.698
522 2.6 0.0 \$3.9 \$2.3 \$4.0 (\$6.0) (\$6.0) \$6.0 (\$6.0) \$6.0		525	2.9	0.0	\$30	\$23	S.	\$62	(\$6)	(\$67)	\$137	\$214	\$238	\$45	\$103	\$715	3.48	3.698
522 2.9 0.0 \$39 \$23 \$60 (\$67) \$137 \$214 \$228 \$45 \$193 \$715 3.46 922 2.9 0.0 \$29 \$23 \$90 \$60 (\$67) \$137 \$214 \$238 \$45 \$193 \$715 3.46 922 2.9 0.0 \$29 \$23 \$90 \$60 (\$67) \$137 \$214 \$238 \$45 \$193 \$715 3.46 922 2.9 0.0 \$29 \$23 \$90 \$60 (\$67) \$137 \$214 \$238 \$45 \$193 \$715 3.46 928 92.0 \$60 (\$60) (\$60) (\$60) (\$60) \$60		522	2.9	0.0	\$30	\$23	\$	\$62	(\$6)	(\$67)	\$137	\$214	\$238	\$45	\$183	\$715	3.46	3.698
922 2.9 0.0 \$39 \$23 \$40 \$607 \$617 \$137 \$214 \$238 \$445 \$190 \$715 3.46 922 2.9 0.0 \$39 \$23 \$9 \$62 (\$69) (\$677) \$137 \$214 \$238 \$445 \$190 \$715 3.46 952 2.9 0.0 \$20 \$20 \$60 (\$677) \$137 \$214 \$238 \$445 \$190 \$715 3.46 9,589 92.5 0.0 \$20 \$1,442 (\$13) (\$171 \$236 \$445 \$190 \$715 3.46 2,604 0.0 \$20 \$1,442 (\$13) (\$171 \$226 \$40 \$20 \$171 \$20 \$20 \$110 \$20		322	2.8	0.0	82	\$23	2	295	9	(\$67)	\$137	\$214	\$238	24.	\$183	\$715	3.48	3.698
522 2.9 0.0 \$39 \$22 \$40 \$450<	T.	222	200	0.0	200	\$23	2	282		(287)	\$137	\$214	\$238	22	\$183	\$715	3.48	3.698
622 2.0 590 \$423 \$60 \$60	J	322	200	000	200	223	2	202	98	(\$67)	\$137	\$214	\$238	22.	\$183	\$715	3.48	3.698
9.589 9.2.5 0.0 \$715 \$728 \$6,142 \$17 \$171 \$207 \$207 \$40 \$257 \$18,650 0.18 7 28,041 0.0 0.0 \$2,000 \$0 \$2,000 \$1,442 \$171 \$240 \$6,521 \$6,521 \$6,501 \$1,280 \$6,221 \$1,280 \$1,280 \$1,290<	T	522	2.9	00	2 83	\$23	9	262	9	(\$67)	137	\$214	\$238	£ 5	50.5	\$715	3.46	3.696
9,589 92.5 0.0 \$715 \$728 \$0 \$1,442 (\$1) (\$71 \$171 \$280 \$40 \$2,680 \$61 \$62,189 \$5,463 \$6,521 \$29,501 \$1,280 \$257 \$1,462 \$171 \$21,80 \$18,21 \$2,180 \$25,780 \$184 \$2,180			•	٠														
28,041 0.0 42,080 \$0 \$2,080 \$0 \$2,180 \$1,080 \$2,180 \$1,180 \$2,180 \$1,280 \$2,180 \$2,2298 \$4,34 \$2,34 \$		9,589	92.5	0.0	\$715	\$728	9	\$1,442	(3)	(\$7)	\$171	\$267	\$297	\$40	\$257	\$18,659	0.18	72.489
28.041 0.0 0.0 82,000 \$0 \$2,000 (\$194) (\$2,159) \$5,463 \$8,521 \$9,501 \$1,200 \$8,22796 4.34 276 0.0 0.0 \$11 \$40 \$20 \$20 \$40 \$20 \$40 \$20 \$40 \$20 \$40 \$20 \$40 \$20 \$40 \$20 \$40 \$20 \$40 \$20 \$20 \$40 \$20 \$40 \$20 \$20 \$40 \$20 \$20 \$40 \$20 \$20 \$40 \$20 \$20 \$40 \$20 \$20 \$40 \$20 \$20 \$20 \$40 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$2			•	•														
276 0.0 0.0 \$21 \$0 \$21 \$60 \$61 \$67 \$137 \$214 \$238 \$45 \$193 \$173 13.32 186 6.0 0.0 \$14 \$47 \$60 \$61 \$67 \$67 \$67 \$427 \$477 \$90 \$580 0.30 4 2,2,576 662.9 0.0 \$168 \$60 \$67 \$613 \$616 \$690 </td <td>5</td> <td>28,041</td> <td>0.0</td> <td>0.0</td> <td>\$2,090</td> <td>8</td> <td>9</td> <td>\$2,080</td> <td>(\$194)</td> <td>(\$2,159)</td> <td>\$5,463</td> <td>\$8,521</td> <td>\$9,501</td> <td>\$1,280</td> <td>\$8,221</td> <td>\$22,296</td> <td>4:34</td> <td>2.712</td>	5	28,041	0.0	0.0	\$ 2,090	8	9	\$2,080	(\$194)	(\$2,159)	\$5,463	\$8,521	\$9,501	\$1,280	\$8,221	\$22,296	4:34	2.712
186 6.0 0.0 \$14 \$47 \$0 \$61 (\$1) (\$7) \$274 \$427 \$477 \$90 \$387 \$820 6.42 4.2	9	276	0.0	0.0	\$21	\$	\$	\$21	(\$\$)	(\$67)	\$137	\$214	\$238	X	\$183	\$173	13.32	0.896
186 6.0 0.0 \$11 \$47 \$6 \$10 \$61 \$61 \$11 \$12 \$12 \$13 \$13 \$13 \$13 \$13 \$13 \$13 \$13 \$13 \$13	8	1	•	1	,	•	•	•										
2,215 61.3 0.0 \$165 \$462 \$0 \$462 \$60.0 \$163 \$416 \$416 \$180 \$69.0 \$180 <th< td=""><td>2</td><td>186</td><td>6.0</td><td>0.0</td><td>\$14</td><td>747</td><td>%</td><td>\$61</td><td>(\$1)</td><td>(2\$)</td><td>\$274</td><td>\$427</td><td>\$477</td><td>06\$</td><td>\$387</td><td>\$820</td><td>6.42</td><td>2.122</td></th<>	2	186	6.0	0.0	\$14	747	%	\$61	(\$1)	(2\$)	\$274	\$427	\$477	06\$	\$387	\$820	6.42	2.122
22,574 682.9 0.0 \$1,683 \$5,375 \$0 \$1,057 \$3,103 \$6,302 \$9,830 \$10,961 \$2,070 \$8,891 \$92,690 1.31 1 750 12.4 0.0 \$56 \$98 \$0 \$153 (\$67) (\$67) \$137 \$214 \$238 \$45 \$198 1.31 1 Facility not used 1,022 12.2 0.0 \$76 \$96 \$0 \$172 (\$67) \$480 \$480 \$6.183 \$2,183 \$2,183 \$2,183 \$2,183 \$2,183 \$2,183 \$2,71 1,022 36.5 \$6.5 (\$67) \$137 \$214 \$236 \$455 \$4483 \$2,183 \$2,71	2 2	2,215	91.3	0.0	\$165	\$482	\$0	\$648	(9\$)	(\$67)	\$137	\$214	\$238	\$45	\$183	\$8,696	0.30	44.991
750 12.4 0.0 \$56 \$98 \$0 \$153 (\$67) \$137 \$214 \$238 \$45 \$198 1.31<	28	22,574	682.9	0.0	\$1,683	\$5,375	0\$	\$7,057	(\$279)	(\$3,103)	\$6,302	\$9,830	\$10,961	\$2,070	\$8,891	\$92,690	1.31	10.428
Facility not used .	=	750		0.0	\$56	\$98	0\$	\$153	(\$\$)	(\$67)	\$137	\$214	\$238	\$45	\$193	\$1,968	1.31	10.185
1,022 12.2 0.0 \$76 \$96 \$0 \$172 (\$6) (\$67) \$308 \$480 \$536 \$85 \$451 \$2,183 2.71	3	Facility not	B681			- -	•											
1012 365 0.0 \$76 \$287 \$0 \$363 (\$6) (\$67) \$137 \$214 \$238 \$45 \$193 \$4,883 0.54	2 :	1,022	12.2	0.0	\$76	\$98	8	\$172	98	(\$87)	\$308	24	\$538	\$85	25	\$2,183	2.71	4.845
	_	210,1	36.5	0.0	\$75	\$287	03	\$363	(98)	(\$67)	\$137	\$214	\$238	\$4 5	\$193	\$4,883	0.54	25.263

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Checker Property	Fac	IECO B6/B7	ECO B6/B7 Energy Savings	801	ECO B6/B7 Energ	7 Energy Co	v Cost Savings	_	Non-Energy Saving	Γ	Construction Cost	in Cost				Life Cycle C	Life Cycle Cost Analysis	10
MANIPOR MIN BTUNO MIN BT	Š	Electric	Propane	1	Electric	Propane	Fuel Oil	, 	Non-Egy	O	Bare	Constr	Total	PG&E	Total	LCC,N=15	Simple	
2 1000 12.3 0.00 8190 897 890 8276 619 (87) 877 8477 8490 8477 8491 1.577 8400 8471 8411 1.57 8400 8471 8411 1.57 8400 8471 8411 1.57 8400 8471 8411 1.57 8400 8471 8411 1.57 8400 8471 8411 1.57 8400 8471 8411 1.57 8400 8471 8411 1.57 8400 8471 8411 1.57 8400 8471 8411 1.57 8400 8471 8411 1.57 8400 8471 8411 1.57 8400 8471 8411 1.57 8400 8471 8411 1.57 8400 8471 8411 1.57 8400 8471 1.57 8400 84		kWH/Yr		_	\$/Year	\$/Year	\$/Year	\$/Year	\$/¥r	\$ Total	Cost	Cost	Cost	Rebate	Invest	Savings	Payback	SIR
2,000 12.3 0.0 8190 827 82 8246 811 877 8277 8477 820 8297 83,113 1.57 2,000 12.3 0.0 8190 8297 82 82 81 81 87 8274 8427 8477 820 8297 83,113 1.57 2,000 12.3 0.0 8190 8297 82 82 82 82 82 82 82 8	T 158			•	'	1		·										
2,006 123 0.00 8150 827 810 827 810 827 812 817 817 810 811 0.07 2,006 123 0.00 8150 827 810 827 812 817 817 817 810 811 0.07 2,006 123 0.00 8150 827 827 817 817 817 810 811 0.07 2,006 123 0.00 8150 827 827 812 817 817 817 810 811 0.07 2,006 123 0.00 8150 827 827 827 827 827 827 827 827 827 827 2,006 123 0.00 8150 827 827 827 827 827 827 827 827 827 827 2,006 123 0.00 8150 827 827 827 827 827 827 827 827 827 827 2,006 123 0.00 8150 827 827 827 827 827 827 827 827 827 827 827 2,006 123 0.00 8150 827 827 827 827 827 827 827 827 827 827 827 2,006 123 0.00 8150 827 827 827 827 827 827 827 827 827 827 827 827 2,007 123 0.00 8150 827 827 827 827 827 827 827 827 827 827 827 827 827 2,007 124 0.00 827 0.00 827 0.00 827 0.00 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007 2,007	T 161	2,006			\$150	2 85	0\$	\$248	(\$1)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$3,113	1.57	8.054
2.006 123 0.00 8150 827 867 819 819 819 812 812 817 812 817 810 811 157 157 150 157 150	T 162	2,006			\$150	\$97	O \$	\$246	(\$1)	(\$7)	\$274	\$427	\$477	\$90	\$387	\$3,113	1.57	8.054
2.006 12.3 0.00 8160 887 89 824 81 87 8274 822 8477 820 85113 1.57 2.006 12.3 0.00 8160 887 89 824 81 87 87 8274 822 8477 820 85113 1.57 2.006 12.3 0.00 8160 887 89 824 81 87 87 824 842 847 840 85113 1.57 2.006 12.3 0.00 8160 887 89 824 81 87 87 824 842 842 842 841 841 1.57 2.006 12.3 0.00 8160 887 89 824 84 84	T 163	2,006			\$150	\$97	<u>ي</u>	\$248	(\$1)	(\$7)	\$274	\$427	\$477	\$80	\$387	\$3,113	1.57	8.054
2.006 12.3 0.0 8150 887 89 8246 811 (87) 8274 8477 8477 8490 85413 1.57 2.006 12.3 0.0 8150 887 89 8246 811 (87) 8274 8427 8477 8490 85413 1.57 2.006 12.3 0.0 8150 887 89 8246 811 (87) 8274 8427 8477 8490 85413 1.57 2.006 12.3 0.0 8150 8242 8172 89 8242 8173 8175 8412 8477 8490 8497 8417 8417 8490 8497 8417 8417 8417 8490 8419 8417	T 164	2,008			\$150	26\$	\$	\$248	(\$1)	(\$7)	\$274	\$427	\$477	08\$	\$387	\$3,113	1.57	8.054
15 15 15 15 15 15 15 15	T 165	2,008			\$150	\$97	o \$	\$248	(\$1)	(\$7)	\$274	\$427	\$477	\$90	\$387	\$3,113	1.57	8.054
2,006 112 3 0.0	T 186	2,006			\$150	20\$	0\$	\$246	(1\$)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$3,113	1.57	8.054
Secondary Control Seco	T 167	2,006			\$150	26\$	0\$	\$248	(\$1)	(\$7)	\$274	\$427	\$477	\$30	\$387	\$3,113	1.57	8.054
1.00 1.00	S 168	·		•	•	•		•										
Signature Sign	T 172			•				•										
2,522 28.4 0.0 4411 4110	P 177	3,526			\$263		0\$	\$394	(9\$)	(\$67)	\$137	\$214	\$238	\$45	\$183	\$4,871		25.203
2.187 2.84 0.00 42.06 43.06 43.0 44.0 46.0	P 178	5,588			\$417	\$176	O \$	\$583	(9\$)	(\$67)	\$21	\$33	\$37	0\$	\$37	\$7,302		199.929
3197 35.6 0.0 422.0 42.0	\$ 182	2,522			\$188	\$231	\$	\$419	(9\$)	(\$67)	\$137	\$214	\$238	\$45	\$183	\$5,405		27.965
Recommend replacement of HVAC Page Pag	S 156	3,197			\$238	\$282	0\$	\$520	(\$1)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$6,771	0.74	17.516
Central replacement of HACC	9 190		•	1	•	•	•											
105 0.00 492.0 492.0 492.0 492.450 42,450	S 197	Recommen	nd replacemen	It of HVAC	,	'	•	,										
105 0.0 482.0 482.40 482.40 48.40 48.40 48.40 48.40 48.280 48.280 48.280 48.290 48.		Central Tie	trit equip, trius				1											
105	2 198	٥			-													
105	P 205				*	2	\$2,450	\$2,438	(c94)	(144%)	819,14	\$2,992	955,53	0894	\$2,706	016,254	41.1	12.163
105 0.00 492.0 58.0 52,450	P 206				<u>'</u>	'												
11,449 6.9 0.0 492.0 482.450 42,450 42,450 452,450 45.44) 41,918 42,92 43,336 4630 42,706 432,910 11.14 11.4	P 207				*	9	\$2,450	\$2,458	(\$82)	(\$944)	\$1,918	\$2,992	\$3,336	\$630	\$2,706	\$32,910	1.14	12.163
11,449 6.9 0.0 \$8653 \$554 \$50 \$908 (\$1) (\$7) \$274 \$427 \$447 \$90 \$5367 \$10,747 0.43	P 208				\$	9	\$2,450	\$2,458	(\$85)	(\$944)	\$1,918	\$2,992	\$3,336	\$630	\$2,708	\$32,910	1.14	12.163
1,238 321,0 0.0 492,0	P 209	L			\$823		0\$	\$908	(\$1)	(25)	\$274	\$427	\$477	06\$	\$387	\$10,747	0.43	27.803
1.23 321.0 0.0 492.0 52.52 52.52 52.450 5	P 210	'	•	•		•		•										
1,236 321.0 0.0 \$92 \$2,526 \$0 \$2,619 \$1,910 \$1,910 \$427 \$437 \$436 \$2,900 \$2,300 \$2,700 \$	P 211	•		•	•		•											
105 0.0 492.0 482.0 482.450 42.456 45.456 45.844 41.918 42.992 43.336 45.336 45.2910 1.14 1	P 212	1,238			\$92	2	\$0	\$2,619	(\$1)	(\$7)	\$274	\$427	\$477	\$80	\$387	\$36,845	0.15	95.318
105	P 219	'														4		
105 0.0 492.0 \$8 \$0 \$2,450 \$2,450 \$2,450 \$1,918 \$2,992 \$3,336 \$52,706 \$32,910 1.14	P 229				8		\$2,450	\$2,458		(\$944)	\$1,918	\$2,992	\$3,336	\$630	\$2,706	سميه	1.1	12.163
	P 230				\$8		\$2,450	\$2,458		(\$944)	\$1,918	\$2,992	\$3,336	\$630	\$2,706	-		12.163
	P 230A																	
	\$ 235	•	•	•	'	•	•	1										
	S 236	•	•	٠	•	-	·											
	S 237	•	•	•	•	-	3	1										
	\$ 238			•		1	1	•									,	
	0 240																	
	240																	
	,																	
		•	•	•														
-	S 243					1	·											
	S 244	•		-	_		- -	-	_					_			_	_

Eco B6/7 Sheet llof 15

Fac	ECO 86/87	Fac ECO 86/87 Energy Savings	sō.	ECO B8/	ECO B6/B7 Energy Co	/ Cost Savings		Non-Energy Saving		Construction Cost	on Cost				Life Cycle C	Life Cycle Cost Analysis	
Š.	Electric	Propane	Fuel Oil	Electric	Propane	Fuel Oil	Total	Non-Egy	227	Bare	Constr	Total	PG&E	Total	LCC,N=15	Simple	
	kWH/Yr	MII BTU/Yr	Mil BTU/Yr	\$/Year	\$/Year	\$/Year	\$/Year	.	\$ Total	Cost	Cost	Cost	Rebate	Invest	Savings	Payback	SIR
S 248	,		•		•	٠	•										
\$ 247	•	•			,	•	•										
P 252	Already has	Already has T-Stats on Clocks	locks		•	•	'										
P 256	Already has	Aiready has T-Stats on Clocks	locks			•	-										
P 259	Already has	Already has T-Stats on Clocks	locks		•	·	•										
8 283	57	23.0	0.0	ä	\$181	\$	\$185	(\$\$)	(\$67)	\$137	\$214	\$238	\$45	\$183	\$2,545	1.08	13.170
S 286			٠		•	-	·										
P 287	Already has	Aiready has T-Stats on Clocks	locks		,	·	•										
S 288	•	•	•		•	·	'										
3 280	9,292	305.4	0.0	\$693	\$2,403	0\$	\$3,096	(\$24)	(\$270)	\$548	\$855	\$953	\$180	\$773	\$41,864	0.25	54.151
\$ 291	5,142	105.7	0.0	\$383	\$832	9	\$1,215	(\$31)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$16,261	0.32	42.087
P 295	74,049	1,159.5	0.0	\$5,520	\$9,125	0\$	\$14,645	(\$728)	(\$8,095)	\$16,440	\$25,644	\$28,593	\$5,400	\$23,193	\$185,695	1.67	8.007
P 301	9,212	317.9	0.0	\$687	\$2,502	0\$	\$3,188	(\$1)	(\$7)	\$274	\$427	\$477	06\$	\$387	\$43,451	0.12	112.407
P 642	•		•			•											
8 2201	•	•	•	Ĺ	-	•	٠										
Totals	215,801	3,399	2,480	\$16,065 \$26,7	\$26,748	\$12,251	\$55,084	(\$1,778)		(\$19,773) \$46,652		\$72,770 \$81,138	\$14,770 \$66,368	\$96,388	\$715,759	1.25	10.785
				Note: Ab	Note: Above totalts d	o not includ	• building	116 results	s do not include building 116 results which have an SIR < 1.0	in SIR < 1.	o.						

				Date Prepared		SHEET	OF
CONSTRUCTION COST EST	TAMI	Ε		February 1	1993	12	15
Project		-		Project No.	Basis for	Estimate	
EEAP Limited Energy Study				16-403-10			
Location		-			Code A	(no design comp	sted)
Fort Hunter-Liggett, California					-		
Engineer-Architect							
Keller & Gannon		Estimate	OF .		Checked	Ву	
ECO-B6/7 (T-Clock / Programmable Ts	tat)	RJB			він		
	Qu	antity		abor	Per	Aaterial	Total
Line Item	No. Units	Unit Meas.	Per Unit	Total	Unit	Total	Total Cost
Building 6							
24 Hour Auto T-Stat	1	EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldg 6)							\$137
Building 41, 42, 43, 44, 45, 51 & 52, ea	ch						
24 Hour Auto T-Stat		EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldgs 41, 42, 43, 44, 45, 51 8	52, ea	ach)					\$274
Buildings 46, 47, 53, 54, 55, 56, 57, 58,			h				
24 Hour Auto T-Stat		EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldgs 46, 47, 53, 54, 55, 56, §	57. 58.	59 & 6	0, each)				\$137
Building 101 Dining & Lounge Areas ar							
Time Clock & Wiring - Din/Lng		EA	\$51	\$102	\$120	\$239	\$341
Time Clock & Wiring - Dwellings	_	EA	\$51	\$1,534	\$120	\$3,587	\$5,121
Subtotal (Bldg 101 Dining & Lounge A	.1					1	\$5,463
Building 116	T			Ĭ			·
24 Hour Auto T-Stat	1	EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldg 116)	 	-					\$137
Building 121	-						
24 Hour Auto T-Stat	2	EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldg 121)	 -		<u> </u>	<u> </u>	1		\$274
Building 124	 	-					
24 Hour Auto T-Stat	1	EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldg 124)	 		402		1 4.00	7.55	\$137
	 	<u> </u>					<u> </u>
Building 128 24 Hour Auto T-Stat	46	EA	\$32	\$1,472	\$105	\$4,830	\$6,302
	1 70	<u> L.A</u>	ΨΟΣ.	Ψ1,-17 L	V.55	0.,000	\$6,302
Subtotal (Bidg 128)	-						40,002
Building 131	1	EA	\$32	\$32	\$105	\$105	\$137
24 Hour Auto T-Stat	 	EA	φ 3 2	40 <u>2</u>	Ψ105	\$105	\$137
Subtotal (Bldg 131)	 				 		Ψ13/
Building 146	+	EA	800	620	\$105	\$105	\$137
24 Hour Auto T-Stat	1 1	EA	\$32	\$32			\$171
Time Clock & Wiring	1	EA	\$51	\$51	\$120	\$120	\$308
Subtotal (Bldg 146)	 					 	\$3 0 0
			l		<u> </u>	l	

CONSTRUCTION COST EST	IMAT	Έ		Date Prepared February 1	1993	SHEET C)5
Project				Project No.	Basis for I		
EEAP Limited Energy Study				16-403-10			
Location Line 2 Line 1 Gy Ctddy				1	Code A	(no design compe	ted)
Fort Hunter-Liggett, California							
Engineer-Architect							
Keller & Gannon Drawing No.		Estimato	ır		Checked I	Ву	
ECO-B6/7 (T-Clock / Programmable Tsi	tat)	RJB			він	•	
200 20, (1 0,000, 1 1 0 3,001, 11 11 11 11	Qu	antity		por		laterial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Building 149							
24 Hour Auto T-Stat	1	EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldg 149)							\$137
Buildings 161, 162, 163, 164, 165, 166 &	<u>k</u> 167,	each					
24 Hour Auto T-Stat	2	EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldgs 161, 162, 163, 164, 165	, 166	& 167,	each)				\$274
Building 177							
24 Hour Auto T-Stat	1	EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldg 177)							\$137
Building 178							
Reset Existing Timer	1	EA	\$16	\$16	\$5	\$5	\$21
Subtotal (Bldg 178)							\$21
Building 182							<u> </u>
24 Hour Auto T-Stat	1	EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldg 182)							\$137
Building 186							
24 Hour Auto T-Stat	2	EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldg 186)				<u> </u>			\$274
Buildings 205, 207, 208, 229 & 230, eac				.	······································		
24 Hour Auto T-Stat		EA	\$32	\$448	\$105	\$1,470	\$1,918
Subtotal (Bldgs 205, 207, 208, 229 & 23	0, ead	ch)			,		\$1,918
Building 209							·
24 Hour Auto T-Stat	2	EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldg 209)							\$274
Building 212	ļ						
24 Hour Auto T-Stat	2	EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldg 212)							\$274
Building 283							
24 Hour Auto T-Stat	1	EA	\$32	\$32	\$105	\$105	\$137
Subtotal (Bldg 283)							\$137
							<u> </u>
Subtotal, this Sheet, including all buildir	ngs					L	\$12,899

				Date Prepared		SHEET	OF
CONSTRUCTION COST ES	TAMIT	Ε		February 1	1993	14	15
Project				Project No.	Basis for	Estimate	
EEAP Limited Energy Study				16-403-10	1		
Location					Code A	(no design comp	eted)
Fort Hunter-Liggett, California Engineer-Architect					1		
Keller & Gannon							
Drawing No.		Estimator			Checked	Ву	
ECO-B6/7 (T-Clock / Programmable	Tstat)	RJB			BIH		
Line Item	Qui No.	untity	Per	bor	Per	Aaterial	Total
Line Rem	Units	Meas.	Unit	Total	Unit	Total	Cost
Building 290					<u> </u>		•
24 Hour Auto T-Stat	4	EA	\$32	\$128	\$105	\$420	\$548
Subtotal (Bldg 290)					ļ		\$548
Building 291				ļ			
24 Hour Auto T-Stat	2	EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldg 291)							\$274
Building 80							
Time Clock & Wiring	1	EA	\$51	\$51	\$120	\$120	\$171
Subtotal (Bldg 80)							\$171
Building 295							
24 Hour Auto T-Stat	120	EA	\$32	\$3,840	\$105	\$12,600	\$16,440
Subtotal (Bldg 295)							\$16,440
Building 301							
24 Hour Auto T-Stat	2	EA	\$32	\$64	\$105	\$210	\$274
Subtotal (Bldg 301)							\$274
					<u> </u>	J	
Subtotal, this sheet		,			T	,	\$17,707
Subtotal (ECO B-6/7)					ļ		\$46,788
Sales Tax 8%							\$3,743
Subtotal							\$50,531
Contractor O.H. & P. 30%			<u> </u>		ļ		\$15,159
Subtotal							\$65,690
Bond 1%					<u> </u>		\$657
Subtotal							\$66,347
Estimating Contingency 10%					<u> </u>	ļ	\$6,635
Total Probable Construction Cost							\$72,982

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

ECO B6/7 Sheet 15 of 15

Location: Fort Hunter Liggett, California Project Title: Install Time Clocks/Programmable T-State	Region No. 4		Project No. 16-403-10 Fiscal Year FY96
Discrete Portion Name: ECO#B-6/7 Analysis Date: March 1993	Economic Life:	15 YEARS	Preparer: KELLER & GANNON
1. Investment Costs A. Construction Costs B. SIOH C. Design Cost D. Total Cost (1A+1B+1C) E. Salvage Value of Existing Equipment F. Public Utility Company Rebate G. Total Investment (1D-1E-1F)	\$72,770 \$4,002 \$4,366 \$81,139	\$0 (\$14,770)	— \$66,369
2. Energy Savings (+)/Cost(-): Date of NISTIR 85-3273-X Used for Discount Factors		-	
Energy Cost Saving Source \$/MTBU/(1) MBTU/YR(2)	Annual \$ Savings(3)	Discount Factor(4)	Discounted Savings(5)
A. Elec. \$21.84 735.5 B. Dist \$4.98 2,460.0 C. Propane \$7.87 3,399.0 D. Demand \$108.60 E. Other		11.70 13.78 14.16 11.70	\$187,917 \$168,816 \$378,782 \$0
F. Total 3. Non Energy Savings (+) or Cost (-):	\$55,062		\$735,515
A. Annual Recurring (+/-) (1) Discount Factor (Table A) (2) Discounted Savings/Cost (3A x 3A1)	(\$1,778)	11.12	(\$19,771)
B. Non Recurring Savings (+) or Cost (-)		•	
Item Savings(+) Year of Cost(-)(1) Occur. (2)	Discount Factor(3)	Doscounted Savings(+)Cost(-)(4)	
a. b. c. d. Total			
C Total Non Energy Discounted Savings (3A2+3Bd4)		(\$19,771)	
 Simple Payback 1G/(2F3+3A+(3Bd1/Economic Life Total Net Discounted Savings (2F5+3C): Savings to Investment Ratio (SIR) 5/1G: Adjusted Internal Rate of Return (AIRR):)):	1.2 \$715,743 10.78 80.27%	Years

Engineers-Architects

COMPUTED BY JCASE	ECO B-8	PROJECT 16-403-10
CHECKED BY 1673	REPLACE INEFFICIENT	FILELAT
DAIL 7.1 SAIL	7.0,00	SHEET NOOF 41_ SHEETS
REV 19	CHILLER	

DESCRIPTION OF ACTION KEMOVE EXISTING COMPRESSUR/CONDENSOR ASSEMBLIES AND REPLACE WITH HIGHER EFFICIENCY UNITS OF SIMILAR TYPE CONVERSION TO WATER COOLED UNITS IS PRECLUDED DUE TO WATER STIDRTAGE ON BASE FACILITIES INCLUDED REFER TO ATTACHED SPREADSHEET PRINTOUTS ENERGY SAVING CALCULATIONS THE ELECTRICAL LEAGE OF THE EXISTING UNITS HAS BEEN SIMULATED BY TRACE GOO COMPUTER RUNS THE EER'S AND COP'S OF THESE UNITS HAVE BEEN OBTAINED FROM MANUFACTURES LITERATURE OR FROM TELEPHONE CONVERSATION WITH MANUE REPS. THE EER'S AND COP'S OF THE NEW UNITS ARE BASED ON THE PUBLISHED COP'S UR NEW, READLY AVAILABLE EQUIPMENTS THE ENERGY SAVINGS ARE BASED ON THE DIFFERENCE BETWEEN THE OLD AND NEW EER'S. THE NEW HIGHER EERS ALSO SAVING ON KW DEMAND.

REVISED JUNE 93

SHEET 20F41

Fac No.	Installation Name	Unit	Existing	Existing	New	New		Demand
		Nominal	Cing Usage	-	Unit EER	Cing Usage	Savings	Savings
		Tonnage	(KWH/YR)			(KWH/YR)	(KWH/YR)	(KW)
S 197	Admin Bldg R&D - Office (1)	35	12,691	8.5	9.7	11,121	1,570	6.1
P 209	AAFES Snack Bar	18	24,297	7.5	9.7	18,786	5,511	6.5
		7.5	10,123	7.5	9.3	8,164	1,959	2.3
S 238	Sig Photo Lab	30	22,606	7.5	9.3	18,231	4,375	9.3
P 295	Enl Barracks w/o Dining	54	93,825	8.5	9.8	81,379	12,446	10.1
P 241	Electron Maint Shop	20	18,751	8.5	9.7	16,431	2,320	3.5
P 128	Officers Quarters Military	25	37,747	7.5	9.7	29,186	8,561	9.1
P 206	Enlisted Pers Dining Fac	40	49,146	7.5	9.7	37,999	11,147	14.5
P 101	Open Din Cons (Hacienda)	20	3,549	7.5	9.7	2,744	805	7.3
P 210	Hith/Dntl Clinic w/ Beds	25	28,404	8.0	9.3	24,434	3,970	5.2
S 290	Electron Equip Facility	25	4,843	7.5	9.3	3,906	937	7.7
P 205	Admin General Purpose	80	75,112	8.5	10.6	60,231	14,881	22.4
P 208	Enl Barracks w/o Dining	80	79,250	8.5	10.6	63,550	15,700	22.4
P 207	Enl Barracks w/o Dining	80	75,112	8.5	10.6	60,231	14,881	22.4
P 230	En! Barracks w/o Dining	80	79,250	8.5	10.6	63,550	15,700	22.4
P 229	Enl Barracks w/o Dining	80	79,250	8.5	10.6	63,550	15,700	22.4
P 81	Theater with Dressing Rm's	120	6,900	9.1	11.3	5,557	1,343	0.0
		40	2,300	8.5	11.4	1,715	5 85	0.0
P 301	ADP Building	60	18,832	8.5	10.8	14,821	4,011	18.0
	TOTALS (SIR's > 1.0)		546,770			443,147	103,623	164

Fac						Single Yea	r Savings	(2)	
No.	Annuai	Life Cycle		1	Total		Year	LCC	Savings
	Cost	Cost	Capitol	PG&E	Invest	Savings	Saving	Savings	Investment
	Savings (\$)	Savings (\$)	Costs (\$)	Rebate	\$	\$	Occurs	\$	Ratio (SIR)
S 197	\$781	\$9,136	\$59,820	\$1,680	\$65,019	\$53,838	NA	NA	0.14
P 209	\$1,120	\$13,106	\$36,984	\$1,584	\$39,113	\$33,286	10	\$22,301	0.91
	\$398	\$4,660		\$540					
S 238	\$1,335	\$15,620	\$45,859	\$2,160	\$48,973	\$41,273	10	\$27,653	0.88
P 295	\$2,026	\$23,704	\$72,689	\$2,808	\$78,240	\$65,420	3	\$58,224	1.05
P 241	\$552	\$6,461	\$32,499	\$960	\$35,276	\$29,249	5	\$23,984	0.86
P 128	\$1,623	\$18,994	\$24,544	\$2,200	\$25,167	\$22,090	5	\$18,113	1.47
P 206	\$2,407	\$28,165	\$119,640	\$3,520	\$129,879	\$107,676	5	\$88,294	0.90
P 101	\$848	\$9,924	\$22,852	\$1,760	\$23,720	\$20,567	3	\$18,304	1.19
P 210	\$865	\$10,123	\$73,352	\$1,300	\$80,487	\$66,017	10	\$44,231	0.68
S 290	\$911	\$10,655	\$24,451	\$1,800	\$25,463	\$22,006	3	\$19,585	1.19
P 205	\$3,539	\$41,408	\$44,261	\$1,120	\$48,231	\$39,835	5	\$32,665	1.54
P 208	\$3,600	\$42,123	\$44,261	\$1,120	\$48,231	\$39,835	5	\$32,665	1.55
P 207	\$3,539	\$41,408	\$44,261	\$1,120	\$48,231	\$39,835	5	\$32,665	1.54
P 230	\$3,600	\$42,123	\$44,261	\$1,120	\$48,231	\$39,835	5	\$32,665	1.55
P 229	\$3,600	\$42,123	\$44,261	\$1,120	\$48,231	\$39,835	5	\$32,665	1.55
P 81	\$100	\$1,172	\$91,641	\$3,360	\$94,180	\$82,477	10	\$55,260	0.60
	\$44	\$510		\$4,640				•	
P 301	\$2,258	\$26,419	\$34,317	\$5,520	\$32,743	\$30,885	10	\$20,693	1.44
	\$25,545	\$298,880	\$400,158	\$19,688	\$426,488	\$360,142	-	\$298,243	1.40

NOTES:

- 1. Building 197 is scheduled for a complete renovation , including HVAC system. ECO Project for this building is withdrawn
- Single year (Non-recurring, non-energy) cost savings represent the avoided cost of replacing units at the ends of their useful lifetimes. Remaining lifetimes, shown by "year of savings" are DEH maintenance worker opinions based on years of experience maintaining the equipment.

File: F:\PROJ\1640310\ENGR\ECO\ECO-B8A:WQ

CONSTRUCTION COST ESTI	MATE			February 1993 Sheet Of 3					
	VIATE				Basis for E				
Project				Project No.	Case ior c	. D. C. 10.10			
EEAP Limited Energy Study			<u> </u>	<u> </u>	Code A	(no design competed	ŋ		
Fort Hunter-Liggett, California									
Engineer-Architect									
Keller & Gannon Drawing No.		Estimator			Checked E)			
ECO B-8 CHILLER REPLOMT BLDG 197									
		ntity	D	Labor	Per	aterial	Total		
Une item	No. Units	Unit Moss.	Per Unit	Total	Unit	Total	Cost -		
	<u> </u>			04.000		**	64 000		
Demolish existing unit	1 1	EA_	-	\$1,000	<u> </u>	\$0	\$1,000		
Deniside 9 Install Backgroup 25 ton unit	+ 1	EA		\$5,250		\$32,100	\$37,350		
Provide & Install Packaged 35 ton unit	+	57		75,250			, ,		
	+						····		
	- 								
	+					1			
	+								
	+	 				1			
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						 	400.050		
Subtotal							\$38,350		
Sales Tax @ 8%				ļ		 	\$3,068		
Subtotal	<u> </u>				<u> </u>	 	\$41,418		
Contractor OH & Profit @ 30%							\$12,425		
Subtotal						 	\$53,843		
Bond @ 1%						<u> </u>	\$538		
Subtotal						L	\$54,382		
Estimating Contingency @ 10%							\$5,438		
Total Probable Construction Cost							\$59,820		

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CONSTRUCTION COST ESTI	MATE			Date Prepared February 1	1993 4/			
Project				Project No.	Basis for E	stimate		
EEAP Limited Energy Study		·			Code A (no design compete	3)	
Fort Hunter-Liggett, California						-		
Keller & Gannon								
Drawing No.		Estimato	•		Checked B	Y		
ECO B-8 CHILLER REPLCMT BLDG 209		<u> </u>		Labor		atarial I		
Line Nam	No. Units	Unit Meas.	Per Unit	Total	Per Unit Total		Total == Cost	
					<u> </u>			
Demolish existing unit	2	EA	\$810	\$1,620	<u> </u>	\$0	\$1,620	
Provide & Install Packaged 18 ton unit	1	EA	-	\$2,200	-	\$12,700	\$14,900	
Provide & Install Packaged 7.5 ton unit	1	EA	-	\$990	-	\$6,200	\$7,190	
	1							
The state of the s	1							
	 							
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	+	_						
	+							
	-							
	+	-						
	 							
	+							
	+							
							\$23,710	
Subtotal	-	ļ			-	 	\$1,897	
Sales Tax @ 8%				· · · · · · · · · · · · · · · · · · ·	-			
Subtotal							\$25,607	
Contractor OH & Profit @ 30%	4						\$7,682	
Subtotal	-						\$33,289	
Bond @ 1%	-						\$333	
Subtotal	ļ						\$33,622	
Estimating Contingency @ 10%	1						\$3,362	
Total Probable Construction Cost	1						\$36,984	

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				Date Prepared		Sheet Of	
CONSTRUCTION COST ESTIM	MATE			February 1	993	5	4/
Project				Project No.	Basis for E	stimete	
EEAP Limited Energy Study					Code A	(no design compete	ri).
Location						(iio deagri compens	u ,
Fort Hunter-Liggett, California Engineer-Architect					†		
Keller & Gannon					1		
Drawing No.		Estimator			Checked	Эу	<u>-</u>
ECO B-8 CHILLER REPLCMT BLDG 238		<u> </u>		Labor		Asterial	
Line item	No.	ntity Unit	Per		Per		Total +
	Units	Meas.	Unit	Total	Unit	Total	Cost -
	ļ			21 222	 		64.00
Demolish existing unit	1 1	EA		\$1,000	<u> </u>	\$0	\$1,00
						22.222	200.40
Provide & Install Packaged 30 ton unit	1 1	EA	-	\$3,800	 -	\$24,600	\$28,40
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		<u> </u>			 	 	
				<u> </u>		 	A
Subtotal					<u> </u>	 	\$29,40
Sales Tax @ 8%					1	1	\$2,35
Subtotal							\$31,75
Contractor OH & Profit @ 30%							\$9,52
Subtotal	1				1		\$41,27
Bond @ 1%	+	 				1	\$41
	+	-			1	1	\$41,69
Subtotal 5 100	+	-		 	 	1	\$4,16
Estimating Contingency @ 10% Total Probable Construction Cost	+	 		 	 	 	\$45,85

-

CONSTRUCTION COST ESTI	MATE		_	Pebruary 1	993	Sheet Of	4/
Project EEAP Limited Energy Study				Project No.	Basis for E	stimate	
Fort Hunter-Liggett, California				•	Code A	no design compete	d)
Engineer-Architect					1		
Keller & Gannon		Estimator			Checked 8		
Drawing No." ECO B-8 CHILLER REPLOMT BLDG 295		Esurine			Cilected	•	
	Quantity Labor Material						
Line Nem	No. Units	Unit Mess.	Per Unit	Total	Per Unit	Total	Total == Cost =
Demolish existing unit	1	EA	<u> </u>	\$1,250	-	\$0	\$1,250
Provide & Install Packaged 50 ton unit	1	EA	-	\$6,450	-	\$38,900	\$45,350
	-						-
	+			<u> </u>			
							····
	1						
Subtotal							\$46,600
Sales Tax @ 8%							\$3,728
Subtotal							\$50,328
Contractor OH & Profit @ 30%							\$15,098
Subtotal							\$65,426
Bond @ 1%	4						\$654
Subtotal	-						\$66,081
Estimating Contingency @ 10%							\$6,608
Total Probable Construction Cost						L	\$72,689

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CONSTRUCTION COST ESTIM	MATE			Date Prepared February 1	993	Sheet Of	41
				Project No.	Basis for E	stimate	
EEAP Limited Energy Study							
cation				<u> </u>	Code A (no design competed	1)
Fort Hunter-Liggett, California]		
ngineer-Architect					1		
Keller & Gannon		Te			Checked 8		
rawing No.		Estimetor			G. ALLANDE	7	
CO B-8 CHILLER REPLCMT BLDG 241	Que	intity		Labor	м	aterial	
Line Item	No. Unite	Unit Meas.	Per Unit	Total	Per Unit	Total	Total =- Cost
	Units	Mess.	O.W.	1000			
	+ 1	EA		\$810	-	\$0	\$810
emolish existing unit	 '	15		1 00.0		70	
	+	EA		\$2,625		\$17,400	\$20,025
Provide & Install Packaged 20 ton unit	1 1	EA		\$2,025	- -	ψ17,700	Ψ20,023
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				<u> </u>	1		
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				<u> </u>	<u> </u>		
Subtotal				1			\$20,835
Sales Tax @ 8%		1					\$1,667
	+	 		1		†	\$22,502
Subtotal	+	+			†		\$6,751
Contractor OH & Profit @ 30%	+	+		 	 	 	\$29,252
Subtotal		+			 	 	\$293
3ond @ 1%	 	-	 	 	 	-	\$29,545
Subtotal	-	 		 	 	 	
Estimating Contingency @ 10%		 	ļ		 	 	\$2,954
Total Probable Construction Cost	1	i	1		1	1	\$32,499

				Date Prepared		Sheet Of	
CONSTRUCTION COST ESTIN	MATE			February 1	993	8	41
Project				Project No.	Basis for E	stimate	
EEAP Limited Energy Study							_
Location					Code A	(no deeign compete	9)
Fort Hunter-Liggett, California					ł		
Keller & Gannon							
Drawing No.		Estimato	-		Checked 8	> Y	
ECO B-8 CHILLER REPLCMT BLDG 128		<u> </u>					
Line Nam	No.	ntity Unit	Per	Labor	Per	aterial	Total -
	Units	Meas.	Unit	Total	Unit	Total	Cost -
	ļ			ļ			
Demolish existing unit	1 1	EA	-	\$810		\$0	\$810
	<u> </u>	<u> </u>					
Provide & Install 25 ton Air Cooled	1 1	EA	-	\$2,625	<u> </u>	\$12,300	\$14,925
DX unit					<u> </u>		
						<u> </u>	
	<u> </u>						
	<u>l</u>						
					:		
	ĺ						
							9
	1						-57
Subtotal							\$15,735
Sales Tax @ 8%	İ						\$1,259
Subtotal							\$16,994
Contractor OH & Profit @ 30%							\$5,098
Subtotal							\$22,092
Bond @ 1%							\$221
Subtotal							\$22,313
Estimating Contingency @ 10%							\$2,231
Total Probable Construction Cost							\$24,544

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				Date Prepared		Sheet Of	
CONSTRUCTION COST ESTIN	MATE			February	1993	9	41
Project				Project No.	Basis for Estim	ate	
EEAP Limited Energy Study					Code A (no.)	iesign competed	1
Location Fort Hunter Liggott California					- COURT (110)		,
Fort Hunter-Liggett, California	· · · · · · · · · · · · · · · · · · ·				1		
Keller & Gannon							
Drawing No.		Estimeto	•		Checked By		
ECO B-8 CHILLER REPLCMT BLDG 206	Que	intity	1 0	bor	Mater		
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
	1 3.1.0						
Demolish existing unit	2	EA	\$1,000	\$2,000	-	\$0	\$2,0
emonon existing time				· · · · · · · · · · · · · · · · · · ·			
Provide & Install Packaged 40 ton unit	2	EA	\$5,250	\$10,500	\$32,100	\$64,200	\$74,7
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	1	1					
	1						
	1						
	1						
	1						
	1						
	1						
Subtotal	1						\$76,
Sales Tax @ 8%							\$6,
Subtotal							\$82,
Contractor OH & Profit @ 30%							\$24,
Subtotal							\$107,
Bond @ 1%	†	 					\$1,
Subtotal	1			!			\$108,
Estimating Contingency @ 10%	 						\$10,
Total Probable Construction Cost	1	 					\$119,6

CONOTRIBOTION COST SCT				Date Prepared	4000	Sheet Of	LI)
CONSTRUCTION COST ESTI	MAIL			February		10	4/
Project				Project No.	Basis for Estim	ato	
EEAP Limited Energy Study					Code A (no c	lesign competed)	
Fort Hunter-Liggett, California						,	
Engineer-Architect					1		
Keller & Gannon							
Drawing No.		Estimeto	7		Checked By		
ECO B-8 CHILLER REPLOMT BLDG 101	Cua	niity		abor	Materi		
Line Item	No. Units	Unit Mess.	Per Unit	Total	Per Unit	Total	Total ·- Cost
	United	Mees.	Unit	104	OTAL	100	
Demolish existing unit	1	EA	\$750	\$750	-	\$0	\$750
Demoish existing unit	+	5	Ψ/30	4,50		- 40	4700
Provide & Install 20 ton Air Cooled	+ 1	EA	\$2,400	\$2,400	\$11,500	\$11,500	\$13,900
DX unit	 	-	Ψ2,700	Ψ2,700	#11,000	711,500	410,000
DX Unit		-					
	+	-			 		·····
777							
		<u> </u>					
2 400							
	_						
					<u> </u>		
	<u> </u>						
Subtotal							\$14,650
Sales Tax @ 8%							\$1,172
Subtotal							\$15,822
Contractor OH & Profit @ 30%							\$4,747
Subtotai							\$20,569
Bond @ 1%							\$206
Subtotal							\$20,774
Estimating Contingency @ 10%	1						\$2,077
Total Probable Construction Cost	1			,			\$22,852

	Date Prepared		Sheet Of								
CONSTRUCTION COST ESTIMATE				February	1993 [] 4]						
roject				Project No.	Basis for Estim	ate					
EEAP Limited Energy Study					Code A (no c	design competed)					
ocation					Code A (no c	readu combaran)					
Fort Hunter-Liggett, California					1						
Keller & Gannon											
Drawing No.							Checked By				
ECO B-8 CHILLER REPLCMT BLDG 210			,	abor .	Material						
Line item	No.			1	Per		Total -				
	Units	Meas.	Unit	Total	Unit	Total	Coet				
	+	F.	6750	\$0.050		\$0	\$2,250				
Demolish existing unit	3	EA	\$750	\$2,250	 	30	₹2,230				
	+-	FA	\$0.60E	\$7 97F	\$12,300	\$36,900	\$44,775				
Provide & Install 25 ton Air Cooled	3	EA	\$2,625	\$7,875	\$12,300	φου, συυ	φ 44 ,//3				
DX unit	-	 			 						
	-										
	+	<u> </u>		<u> </u>		 					
	 										
						 					
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		<u> </u>									
	1										
	1										
	1										
Subtotal	1						\$47,025				
Sales Tax @ 8%	1						\$3,762				
Subtotal	†						\$50,787				
Contractor OH & Profit @ 30%	1		<u> </u>				\$15,236				
Subtotal	+	 					\$68,023				
	+-		 				\$660				
Bond @ 1%	+	 					\$66,683				
Subtotal	+						\$6,668				
Estimating Contingency @ 10% Total Probable Construction Cost	+		 			 	\$73,352				

CONSTRUCTION COST ESTIMATE				February	1993	Sheet of 12 41				
Project EEAP Limited Energy Study					Basis for Estimate					
Fort Hunter-Liggett, California						Code A (no design competed)				
Engineer-Architect										
Keller & Gannon Drawing No.		Estimato	•		Checked By					
ECO B-8 CHILLER REPLOMT BLDG 290					,					
Line Norm		antity Labor			Material					
	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total an Cost			
Demolish existing unit	1	EA	\$750	\$750	-	\$0	\$750			
3	1						· · · · · · · · · · · · · · · · · · ·			
Provide & Install 25 ton Air Cooled	1	EA	\$2,625	\$2,625	\$12,300	\$12,300	\$14,925			
DX unit	<u> </u>						-			
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Subtotal							\$15,675			
Sales Tax @ 8%							\$1,254			
Subtotal							\$16,929			
Contractor OH & Profit @ 30%			 -				\$5,079			
Subtotal	†						\$22,008			
Bond @ 1%	1						\$220			
Subtotal	1									
	+						\$22,228			
Estimating Contingency @ 10%	1						\$2,223			
Total Probable Construction Cost	<u> </u>	1					\$24,451			

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		_		<u> </u>		Sheet Of	
CONSTRUCTION COST ESTIMATE				February	1993	13	4/
			Project No.	Basis for Estim		• (
EEAP Limited Energy Study				, ,			
Location					Code A (no d	lesign competed)	
Fort Hunter-Liggett, Califomia							
Engineer-Architect							
Keller & Gannon		Estimato	r		Checked By		
ECO B-8 CHILLER REPLCMT BLDG 205							
Line Nam	Quantity		L	Labor Per		Material Per	
	No. Units	Unit Meas.	Unit	Total	Unit	Total	Total Cost
		ļ		4750		60	A750
Demolish existing unit	1 1	EA	\$750	\$750	<u> </u>	\$0	\$750
Provide & Install 80 ton Air Cooled	1	EA	\$2,625	\$2,625	\$25,000	\$25,000	\$27,625
	<u> </u>	-	ΨΕ,σΕσ	V-,	V	V=3,033	V,
DX unit							
Note: This cost estimate is the same		<u> </u>		-			
for BLDG'S 208, 207, 230, 229							
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					<u> </u>		
Subtotal							\$28,375
Sales Tax @ 8%							\$2,270
Subtotal							\$30,645
Contractor OH & Profit @ 30%							\$9,194
Subtotal							\$39,839
Bond @ 1%							\$398
Subtotal							\$40,237
Estimating Contingency @ 10%							\$4,024
Total Probable Construction Cost							\$44,261

				Date Prepared		Sheet Of	
CONSTRUCTION COST ESTI	MATE			February	1993	14	41
				Project No.	Basis for Estim	<u> </u>	
Project EEAR Limited Energy Study				110,000			
EEAP Limited Energy Study Location				l	Code A (no d	design competed)	
Fort Hunter-Liggett, California							
Engineer-Architect							
Keller & Gannon							
Drawing No.		Estimeto	r		Checked By		
ECO B-8 CHILLER REPLCMT BLDG 81	Cus	ntity		abor	Mater		
Line Item	No.	Unit	Per	T T	Per Unit	Total	Total -
	Units	Meas.	Unit	Total	Onit	1008	Cost
	+ -	EA	\$1,000	\$2,000	_	\$0	\$2,000
Demolish existing unit	2	EA	\$1,000	\$2,000	-	\$0	\$2,000
	+	-	\$0.050	#0.050	\$07 E00	\$27.500	\$40.750
Provide & Install 120 ton Air Cooled	1 1	EA	\$3,250	\$3,250	\$37,500	\$37,500	\$40,750
DX unit			00 100	00 400	640.000	640.000	A40.000
Provide & Install 40 ton Air Cooled	1 1	EA	\$2,400	\$2,400	\$13,600	\$13,600	\$16,000
DX unit			<u> </u>				
			ļ.				
	1						
	1						
	1						
	+						
Subtotal	+	 					\$58,750
Sales Tax @ 8%	+	<u> </u>					\$4,700
Subtotal	+						\$63,450
Contractor OH & Profit @ 30%	+						\$19,035
Subtotal	+						\$82,485
	+						\$825
Bond @ 1%	-						\$83,310
Subtotal	 						\$8,331
Estimating Contingency @ 10%	-						
Total Probable Construction Cost						L	\$91,641

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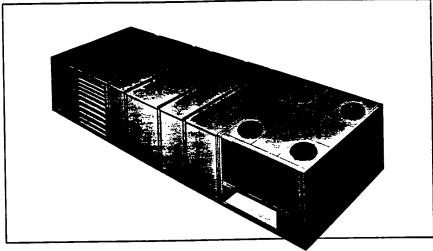
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CONSTRUCTION COST EST	IMATE	<i>u</i>		February			41
Project EEAP Limited Energy Study				Project No.	Basis for Estim		
Fort Hunter-Liggett, California					Code A (no d	(beteqmoo ngiset	
Engineer-Architect							
Keller & Gannon	·	Tr-4			Checked By		
Drawing No.		Estimato	ſ		Criscined by		
ECO B-8 CHILLER REPLCMT BLDG 301		ntity	L	abor	Mater	iai	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Demolish existing unit	1	EA	\$1,000	\$1,000	-	\$0	\$1,000
Provide & Install 60 ton Air Cooled	1	EA	\$2,100	\$2,100	\$18,900	\$18,900	\$21,000
DX unit	 -		V= ,	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		, ,	·
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						<u> </u>	, , , , , , , , , , , , , , , , , , ,
							
Subtotal							\$22,000
Sales Tax @ 8%			-				\$1,760
Subtotal							\$23,760
Contractor OH & Profit @ 30%							\$7,128
Subtotal							\$30,888
Bond @ 1%	1						\$309
Subtotal							\$31,197
Estimating Contingency @ 10%		<u> </u>					\$3,120
Total Probable Construction Cost							\$34,317

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP) Sheet 16 of 41

ECO B-8

	Fort Hunter Ligge Chiller Replaceme	nt	Region No. 4			Project No. 16-403-10 Fiscal Year FY96
	tion Name: ECO# E e: June 1993	3-8	Economic Life:	15	YEARS	Preparer: KELLER & GANNON
E. Salvage V F. Public Uti	ion Costs		\$400,158 \$22,009 \$24,009 \$446,176	- - -	\$0 \$19,688	 \$426,488
2. Energy Sa	avings (+)/Cost(-): IR 85-3273-X Used	for Discount Factors		-		
Energy Source	Cost \$/MTBU/(1)	Saving MBTU/YR(2)	Annual \$ Savings(3)		Discount Factor(4)	Discounted Savings(5)
A. Elec. B. Dist C. Propane D. Demand	\$21.84 \$4.98 \$7.87 \$108.60	353.7 0.0 0.0 164.1 kV	\$7,724 \$0 \$0 \$0 V \$17,821		11.70 13.78 14.16 11.70	\$90,371 \$0 \$0 \$208,508
E. Other F. Total			\$25,545	=		\$298,880
3. Non Ener	gy Savings (+) or C	Cost (-):		_		
(1) Discount	ecurring (+/-) Factor (Table A) ed Savings/Cost (3	A x 3A1)	\$0	-	11.12	\$0
B. Non Recu	ırring Savings (+) o	or Cost (-)				
ltem	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)		Discounted Sav- ings(+)Cost(-)(4)	
a. b. c. d. Total	\$107,993 \$221,264 \$30,885 \$360,142	3 5 10	0.89 0.82 <u>-</u> 0.67	=	\$96,114 \$181,437 \$20,693 \$298,243	- - -
C Total Non	Energy Discounted	Savings (3A2+3Bd4)			\$298,243	
5. Total Net 6. Savings to	ayback 1G/(2F3+3A Discounted Savings o Investment Ratio Internal Rate of Ret	(SIR) 5/1G:	e)):		8.6 \$597,123 1.40 9.92 %	Years

Catalog 205-4



BLOG 238, 31 Tons unit

Roofpak:
Single Zone:
Heating & Cooling:
Units:

Type RPS Sizes 18-120 tons



Physical data

TABLE 1

RPS Unit Size	018B	0200	COED	0000	0000
Nominal Capacity (tons)*	17.7	0208 20.4	025B 25.6	0308	036B
Nominal CFM	7,000	8,000	10.000	30.1 12,000	34.8
Compressor	7,000	0,000	10,000	12,000	14,000
Туре	<u> </u>	Δ	ccessible Semi-Hermet		
Number-HP	1-20	1-25	1-30	1-35	1-40
Number of Cylinders	4	4	6	6	6
Capacity Control (Std.)	100/50/0	100/50/0	100/66/0	100/66/0	100/66/0
Optional Capacity Control (1)	-		100/66/33/0	100/66/33/0	100/66/33/0
Evaporator Section		· · · · · · · · · · · · · · · · · · ·	70070070370	100/00/33/0	100/00/33/0
Number of Rows Std. (Opt.)	2(3, 4, 5)	2(3, 4, 5)	2(3, 4, 5)	2(3, 4, 5)	3(4, 5)
Face Area (sq. ft.)	18.8	18.8	27.3	27.3	27.3
Supply Air Fans				27.0	27.5
Туре		Low	Pressure, Forward Cu	rved	
Number-Diameter (in.)	2-15	2-15	2-15	2-15	1-24
CFM Range	4,000-12,000	5,600-12,000	5,600-16,000	5,600-16,000	11,200-17,700
Туре		Mediu	m Pressure, Forward C	urved	
Number-Diameter (in.)	-		-	_	1-24
CFM Range	-	-	_	-	11,200-17,700
Type -		Low-Me	edium Pressure, Airfoi	or Backward Curve	
Number-Diameter (in.)	-	<u> </u>		_	1-24
CFM Range		_			11,200-17,700
Condenser Coil					
Circuits/Rows	1/2	1/2	1/3	1/3	1/2
Face Area (sq. ft.)	42.2	42.2	42.2	42.2	62.5
Condenser Fan					
Type Number-Diameter (in.)	2.00	0.00	Propeller		
CFM Std.	2-26 17,040	2-26 17,040	3-26	3-26	4-26
Condenser Fan Motor	17,040	17,040	23,700	23,700	32, 720
Number-HP	2-1.5	2-1.5	3-1,5	3-1.5	4-1.5
Speed (RPM)	1140	1140	1140	1140	1140
Drive	1170	1170	Direct Drive	1140	1 1140
Water Heating Coils		· · · · · · · · · · · · · · · · · · ·	Direct Direc		
Туре		Low	Capacity Coil-1/2"	D.D.	
Fins/Rows	12/1	12/1	12/1	12/1	12/1
Face Area (sq. ft.)	20.3	20.3	20.3	20.3	20.3
Type		High	Capacity Coil-1/2"	D.D.	
Fins/Rows	12/2	12/2	12/2	12/2	12/2
Face Area (sq. ft.)	20.3	20.3	20.3	20.3	20.3
Steem Heating Coils		,			
Type			Coil-1" O.D., Jet Dis		
Fins/Rows	6/1	6/1	6/1	6/1	6/1
Face Area (sq. ft.)	20.3	20.3	20.3	20.3	20.3
Type Fins/Rows	10/4	High Capacity		tributing Type	
Face Area (sq. ft.)	12/1	12/1	12/1	12/1	12/1
Natural Gas or Oil Furnece	20.3	20.3	20.3	20.3	20.3
Input (MBH)	,	** 250, 212, 400,	500; 625; 800; 812; 9	00. 1000. 1050	
Output (MBH) Furnace Size		** 200, 312, 400,	400: 500: 640: 650: 7	1000; 1200	
Filters (Std.)	<u> </u>	200, 230, 320,	400, 300, 040, 030, 1	30, 800, 1000	
Area (sq. ft.)	52.7	52.7	52.7	52.7	52.7
Number-Size (in.)			16 x 25 x 2, 5-16 x 20		
Optional Filters		1.5	1.29-5		
Туре	1	······································	45% Bag Filters		
Number-Size (in.)	I	4-24	× 24 × 22, 4-12 × 24	x 22	
Туре			95% Bag Filters		
Number-Size (in.)		4-24	× 24 × 35, 4-12 × 24	x 35	
Туре			-Filters (For Bag Filte		
Number-Size (in.)	<u> </u>	4-2	4 x 24 x 2, 4-12 x 24	x 2	
Optional Return Air Fens					
Туре			v Pressure Forward Cu		
Number-Diameter (in.)	2-15	2-15	2-15	2-15	Select Airfoil
Standard CFM	5,600	6,400	8,000	9,600	
Type	 	,	v-Medium Pressure Air		
Number-Diameter (in.)		-	<u> </u>		1-40 x 14
Standard CFM Connections				<u>-</u>	11,200
	14 70	14 70	14 , 79	14 30	10.50
Discharge Duct Bottom Return Duct	14 x 78 20 x 82	14 x 78	14 x 78 20 x 82	14 x 78	18 x 78
Back Return		20 x 82		20 x 82	***
COCK DECUM	15 5/8 x 90	15 5/8 x 90	15 5/8 x 90	15 5/8 x 90	L ****



^{**}Furnace size availability is limited by minimum CFM requirement per table 21A on page 81.

[&]quot;"Without return fan: 24 x 82"; with return fan: 36 x 78".

^{****}Not available on units with return fan. Back return dimensions without return fan is 15 5/8 x 90".

Unit size 030B

,,,		VT.						TAIR TE	MPERAT	URE (-)			/
UNIT DATA		IR ∻⊷ MP	10.75	85.7	-	1	95	o in washing So, I washing in		105	ش		115	A.
	DB	.WB	TH	SH	SOUTH CO.	THE	SH	KW	L	CLI	KW	TU		
		71	397	167	33.2	378	160	35.8	TH 358	SH 152	38.5	TH ***	SH_	***
	75	67	371	208	32.0	353	201	34.4	334	193	37.0	314	185	39.
RPS-030B		63	***	***	***	329	242	33.1	312	234	35.6	292	226	38.
NF3-030B		71	396	215	33.2	377	208	35.8	357	200	38.5	***	***	***
10,000 CFM	80	67	370 ***	256 ***	31.9	352	249	34.4	333	241	37.0	313	233	39.
10,000		63 71	396	263	33.2	329 377	289 256	33.1	311	281	35.6	293	272	38.
2-ROW EVAP.	85	67	370	304	31.9	351	297	34.4	357 333	248 289	38.4	*** 314	281	39.
		63	***	***	****	332	327	33.3	317	317	36.0	302	302	38.
STD. COIL		71	395	311	33.1	376	304	35.7	356	296	38.4	***	***	***
	90	67	371	349	32.0	354	340	34.5	336	328	37.2	319	319	40.
		63	362	362	31.5	348	348	34.2	334	334	37.0	318	318	40.
		71	408	174	33.7	387	167	36.3	366	159	39.0	***	***	***
att of the	75	67	381	222	32.4	362 337	215	34.9	342	207	37.5	321	199	40.
RPS-030B		63 71	356 407	270	31.2	387	262	33.6	319 366	254 216	36.1	300	246	38.
NF3-030B	80	67	381	278	32.4	361	271	34.9	341	263	39.0 37.5	***	***	***
12,000 CFM	- 50	63	356	325	31.2	339	316	33.7	321	307	36.2	321 302	255 296	40. 38.
_,		71	407	287	33.7	386	279	36.2	365	272	38.9	***	***	***
2-ROW EVAP.	85	67	380	334	32.4	362	326	35.0	342	317	37.6	323	307	40.
		63	364	364	31.6	350	350	34.3	334	334	37.0	318	318	40
STD. COIL		71	406	343	33.6	387	335	36.3	366	327	39.0	***	***	***
	90	67	385	378	32.7	369	369	35.3	353	353	38.2	***	***	***
·		63	384	384	32.6	369	369	35.3	353	353	38.2	***	***	**
المان المان المان المان المان المان المان المان المان المان المان المان المان المان المان المان المان المان ال المان المان ال	75	71	416	181	34-1	395	174	36.7	373	166	39.4	***	***	***
The second second	15	67	388 363	235 289	32.8	369 344	228	35.3	348	220	37.9 36.5	327	212	40
RPS-030B		71	415	245	34.0	394	238	36.7	372	230	39.3	305	265	39
	80	67	388	299	32.8	368	292	35.3	348	284	37.9	327	276	40
14,000 CFM		63	365	349	31.7	348	339	34.2	330	326	36.8	312	312	39.
\$ 5.5°		71	414	309	34.0	394	302	36.6	372	294	39.3	***	***	***
2-ROW EVAP.	85	67	389	361	32.9	371	352	35.4	351	341	38.1	***	***	***
200		63	380	380	32.4	365	365	35.1	348	348	37.9	***	***	***
STD. COIL		71	416	372	34.1	395	363	36.7	375	354	39.5	***	***	***
	90	67	401	401	33.4	385	385	36.2	368	368	39.1	***	***	***
		71	401	401	33.4	385 390	385 164	36.2	368	368	39.1	***	***	***
200	75	67	410 382	172 212	33.8	363	204	36.4	369	156 196	39.1 37.6	*** 323	***	***
- 	' '	63	356	252	31.2	339	245	33.7	320	236	36.2	301	188	40. 38.
RPS-030B		71	410	219	33.8	390	211	36.4	369	204	39.1	***	***	***
NF3-U3UB	80	67	382	260	32.5	363	252	35.0	343	244	37.6	323	236	40.
10.000 CFM		63	356	300	31.2	338	292	33.7	320	284	36.2	301	275	38.
73 · · · · · · · · · · · · · · · · · · ·		71	409	267	33.8	389	259	36.4	368	251	39.1	***	***	***
3-ROW EVAP.	85	67	381	307	32.4	363	299	35.0	343	291	37.6	323	283	40.
		63	358	345	31.3	341	335	33.8	325	325	36.5	308	308	39.
1	90	71	409 382	314 354	33.8	389 364	306 345	35.4	368	298	39.1	***	***	***
	۳۰ ا	63	371	371	32.0	356	356	34.7	346 341	335 341	37.8 37.5	*** 325	325	***
nine has		71	422	179	34.4	401	171	37.0	379	163	39.7	323 ***	323 ***	40.
- Trans	75	67	393	226	33.0	374	218	35.6	353	210	38.2	***	***	***
		63	367	273	31.8	349	265	34.2	329	257	36.7	309	248	39.
		71	422	234	34.3	400	227	37.0	378	219	39.7	***	***	***
RPS-030B	80	67	393	282	33.0	373	274	35.6	352	266	38.2	***	***	***
12,000 CFM		63	367	328	31.8	349	320	34.3	330	311	36.8	310	300	39
12,000 CFM	, ,	71	421	290	34.3	400	282	37.0	378	274	39.7	***	***	***
3-ROW EVAP.	85	67	393	337 374	33.0 32.1	374 358	329 358	35.6 34.7	353	321	38.2	***	***	***
		71	421	346	34.3	400	338	36.9	342 378	342 330	37.5 39.7	325 ***	325	40 ·
	90	67	397	387	33.2	379	379	35.9	361	361	38.7	***	***	***
÷	~	63	393	393	33.0	378	378	35.8	361	361	38.7	***	***	**
سينوب د	T	71	431	186	34.8	409	178	37.4	386	170	40.1	***	***	***
- 7	75	67	402	239	33.5	382	231	36.0	360	223	38.6	***	***	***
		63	375	292	32.2	356	284	34.6	336	276	37.1	315	267	39.
RPS-030B		71	431	249	34.8	409	241	37.4	385	233	40-1	***	***	**
- 77	80	67	402	303	33.4	381	295	36.0	360	286	38.6	***	***	***
14,000 CFM	ļ	63	376	354	32.3	358	344	34.7	339	332	37.4	320	320	40
		71	430	312	34.7	409	305	37.4	385	296	40.1	***	***	***
3-ROW EVAP.	85	67	403 391	365 391	33.5	382	356	36.0	362 357	346	38.7 38.5	***	***	***
3-NOW EVAL.				1 271	132.9	374	1 374	35.6	/	357		***	***	***
J-NOW EVAL.		63			T		-		7					_
S-NOW EVAL.	90	71	431	375	34.7	409 395	367 395	37.4	386 378	35 8 37 8	40.2	***	***	***



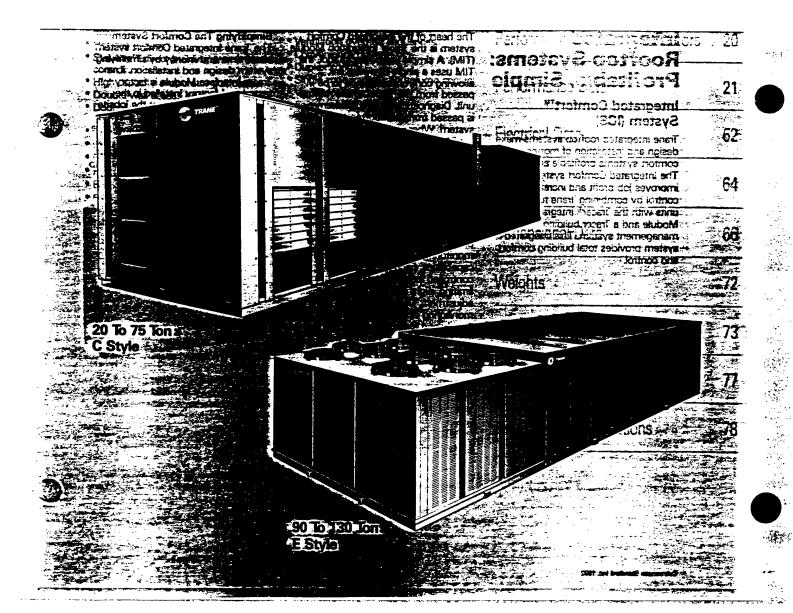
20 OF 41 S-1

RT-DS-1 November 1992

First Printing

Packaged Rooftop Air Conditioners BLDG 206

20 To 130-Tons C and E Style





Model Number **Description**

DIGIT 11 - EXHAUST

2 = 100%, 1½ HP A = 50%, 1½ HP

5 = 100%, 7½ HP D = 50%, 7½ HP

DIGIT 12 — EXHAUST AIR FAN DRIVE

SELECTION

= Barometric

3 = 100%, 3 HP

4 = 100%, 5 HP

6 = 100%, 10 HP

0 = None

0 = None

4 = 400 RPM

5 = 500 RPM

6 = 600 RPM

7 = 700 RPM

DIGIT 13 - FILTER

B = Cleanable Wire Mesh

F = No Filters (T/A Rack)

C = High-Efficiency Throwaway

D = 90-95% Bag With Prefilters

G = No Filters (Bag/Cart. Rack)

DIGIT 14 - SUPPLY AIR FAN HP

DIGIT 15 - SUPPLY AIR FAN DRIVE

SELECTIONS

E = 90-95% Cartridge With Prefilters

A = Throwaway

1 = 3 HP

2 = 5 HP

3 = 71/2 HP

4 = 10 HP

5 = 15 HP

5 - 500 RPM

6 - 600 RPM

7 = 700 RPM

8 = 800 RPM

9 - 900 RPM

C 0 В $\overline{3}$ $\overline{4}$ $\overline{567}$ $\overline{8}$ $\overline{9}$ $\overline{10}$ $\overline{11}$ $\overline{12}$ $\overline{13}$ $\overline{14}$ $\overline{15}$ $\overline{16}$ $\overline{17}$ $\overline{18}$ $\overline{19}$ $\overline{20}$ $\overline{21}$

7 = 100%, 15 HP

8 = 100%, 20 HP

B = 50%, 3 HP

C = 50%, 5 HP

8 = 800 RPM

9 = 900 RPM

A = 1000 RPM

B = 1100 RPM

6 = 20 HP

7 = 25 HP

8 = 30 HP

9 = 40 HP

A = 1000 RPM

B = 1100 RPM

C = 1200 RPM

D = 1300 RPM

E = 1400 RPM

F = 1500 RPM

DIGIT 1 - UNIT TYPE

S = Self-Contained (Packaged Rooftop)

DIGIT 2 — UNIT FUNCTION

- A = DX Cooling, No Heat
- E = DX Cooling, Electric Heat**
- F = DX Cooling, Natural Gas Heat
- L = DX Cooling, Hot Water Heat*
- S = DX Cooling, Steam Heat*
- X = DX Cooling, No Heat, Extended Casing *(See Note 2)
 - **(See Note 3)

DIGIT 3 — UNIT AIRFLOW

H = Single Zone

DIGIT 4 -- DEVELOPMENT SEQUENCE

C = Third

DIGITS 5,6,7 — NOMINAL CAPACITY

- C20 = 20 Tons C55 = 55 Tons
- C60 = 60 Tons C25 = 25 Tons
- C30 = 30 Tons C70 = 70 Tons
- C75 = 75 Tons C40 = 40 Tons
- C50 = 50 Tons

DIGIT 8 - POWER SUPPLY (See Note 1)

- 1 = 460/60/3 PWS A = 380/50/3 PWS
- 2 = 575/60/3 PWS B = 415/50/3 PWS
- 3 = 230/60/3 PWS C = 380/50/3 XL
- D = 415/50/3 XL4 = 460/60/3 XL5 = 575/60/3 XI F = 200/60/3 XL
- 6 = 200/60/3 PW/SF = 230/60/3 XL

DIGIT 9 — HEATING CAPACITY

- H = High Heat
- L = Low Heat 0 = No Heat

Note: When the second digit is "E" for " electric heat, the following values

- apply in the ninth digit:
- D = 30 KW R = 130 KW H = 50 KW U = 150 KW L = 70 KW V = 170 KW
- N = 90 KW W = 190 KW
- Q = 110 KW

DIGIT 10 - DESIGN SEQUENCE

- A = First (Factory Assigned)
- B = Second, etc.

- 1. 20 through 60-ton units available in XL only.
- 2. When the second digit calls for "L" or "S", one of the following valve size values must be in digit 21 (Misc.): 1 = ½" 2 = ¾" 3 = 1" 4 = 1¾" 5 = 1½" 6 = 2"
- 3. SEHC units (units with electric heat) utilizing 208V or 230V require dual power source.

EXAMPLE:

Model numbers: SFHCC254HC00B39A1A10L describes a unit with the following characteristics: DX cooling with natural gas heating, 25 ton: nominal cooling capacity, 460/60/3 power supply, high heat model. No exhaust or drive selection, cleanable wire mesh filters, 7½ hp supply an motor, supply fan drive selection No. 9 — (900 RPM), no fresh air, constant volume control, no accessory panel, 0 F ambient control, no agency approval and high-efficiency motors.

DIGIT 16 - FRESH AIR SELECTION

- A = No Fresh Air
- B = 0-25% Manual
- D = 0-100% Economizer

DIGIT 17 - SYSTEM CONTROL

- 1 = Constant Volume Electronic -
- Room Thermostat
- 3 = Variable Air Volume Electronic Supply Air With FROSTAT

DIGIT 18 - ACCESSORY PANEL

- A = None
- B = Signal Light Connection For Field Supplied Panel
- C = Remote Panel
- D = Remote Panel With Night Setback

DIGIT 19 — AMBIENT CONTROL

0 = Standard 1 = 0 F

DIGIT 20 — AGENCY APPROVAL
0 = None 1 = UL 2 = CSA

(Only One Agency Approval Can Be > Ordered)

DIGIT 21 — MISCELLANEOUS (See Note 2)

- A Unit Disconnect Switch
- B = Hot Gas Bypass
- = Ultra Low Leak Fresh Air Dampers
- = High Duct Temperature Thermostat
- G = High Capacity Option (N/A on 70 Ton) ~
- H = Copper Condenser Fins
- J = Remote Setpoint (VAV only)
- K = Zone Reset (VAV only)
- L = High-Efficiency Motors
- M = Fast Warm-Up Thermostat (VAV Only) N = Inlet Vanes - Supply Fan With -
- Controls
- Extended Grease Lines
- T = Access Doors
- X = Compressor Lockout Thermostat:::: (Economizer Only)
- ICS Control Option-Tracer Integratio Module (TIM)
- 8 = Two-Inch Spring Isolators



General Data

Table 8-1 — General Da	sta — 20-40	Ton
------------------------	-------------	-----

	20 Ton	25 7	lon	30	Ton	40	Ton
Compressor Data				_			
Number/Size (Nominal)	2/10 Ton	1/10 Ton,		2/15	Ton	4/10	Ton
Model	Scroll	Sch			roll		roll
Unit Capacity Steps (%) RPM	100/50	100			0/50		V50/25
vaporator Fans	3450	345	50	34	150	34	50
Number/Size/Type	2/15"/FC	045					
Hp Range		2/15			3"/FC		r"/FC
Cfm Range ¹	3-10 4000-9000	3-1			20		-25
TSP Range (In. WG)		5000-1			13500		18000
xhaust Fans	0.25-4.0 50% 100%	0.25			5-4.0		-4.0
			100%	50%	100%	50%	100%
Number/Size/Type	1/15"/FC 2/15"/		2/15"/FC	1/15"/FC	2/15"/FC	1/18"/FC	2/1 8"/FC
Hp Range	1.5-3 1.5-3		3-5	3-5	3-7.5	5-7. 5	5-10
Cfm Range	2000-6000 4000-10		4000-12000	2000-7000	4000-14000	3000-11000	6000-1600
ESP Range — (In. WG)	0.25-1.4 0.2-2.	0 0.25-1.4	0.2-2.0	0.25-1.4	0.2-2.0	0.25-1.4	0.2-2.0
ondenser Fans	-						
Number/Size/Type	2/26"/Prop.	3/26~/1	Prop.	3/26"	/Ртор.	4/26"	Ргор.
Hp (Each)	1.0	1.0	0	1	.0	1.	.0
Cfm	13600	183	00	209	900		200
Cycle/Phase	60/3	60/	3	60	2/3	60	V3
vaporator Coil — Standard							
Size (Ft²)	16.3	20.	.3	24	1.4	32	2.8
Rows/Fin Series	2/144	2/14	44		144		44
Tube Diameter/Surface	1/2/Enhanced	1/2/Enha	enced		nanced		anced
vaporator Coil — High Capacity				, E. E. III.		/2/LIH	
Size (Ft²)	16.3	20.	3	24	1.4	32	2.5
Rows/Fin Series	4/144	4/14	44	4/1	44		44 .
Tube Diameter/Surface	1/2/Enhanced	1/2/Enha			anced	½/Enh	
Condenser Coil (Aluminum Fins)						/ <u>J</u> L3 II I	uncou
Size (Ft ²)	35.0	35.	.O .	46	3.3	63	2
Rows/Fin Series/Tube Diameter	3/156/ %	3/156	V %	3/16	8/ %	3/16	
opper Condenser Fins (Optional)	3/144/ %	3/144			6/ %		6/ %
lectric Heat							
KW Range ²	30-110	30-1	30	30-	150	50-	170
Capacity Steps: CV/VAV	3/1	3/1			/1	3/	
latural Gas Heat					•		
Low Heat Input	235	23	5 -	35	50	36	i0
High Heat Input	500 ∹	50	Ŏ	50	00	85	
Capacity Steps: CV/VAV	2/1	2/1		2		2/	
fot Water Coil			<u> </u>				<u>' </u>
Size (Inches)	30 x 66 x 2 Row	30×66×	2 Row	30×66	x 2 Row	42×66>	2 Par
Type	Type W, Prima Flo	Type W, P		Type W. I		Type W. f	
High Heat (Fins/Ft)	110	110		11		19pe w, 1	
Low Heat (Fins/Ft)	80	80		8			
teem Coil			<u></u>		<u> </u>	8	<u> </u>
Size (Inches)	30 x 66 x 1 Row ~	20 4.00 4	1 Row -	20 488	k 1 Row		
Orto (II IC) IGBI	30 x 66 x 1 how ~	30 X 00 X	I HOW =	30 X 90 7	KI NOW -	30×66×	
Type ^	T NC	T	NC	T	. NC		1 Row
High Heet (Fins/Ft)	Type NS	Тура		Type	ins 6.≁	Туре	
Low Heat (Fins/Ft)	96 +/- 42	96 42		4			j
ilters		42			<u> </u>	4;	2
Panel Filters							
	40 00 00 -			16 20	20 0		
Number/Size (Inches)	12 — 20×20×2	12 - 20				16 — 20	
Face Area (Ft²)	33.3	33.	3.41	44	تده	55.	.5 -∓
Bag Filters					. 24	_	_
Number/Size (Inches)	4 — 12×24×19	4-12×		2 — 12 >		5 — 12 ×	
Court m.	3 - 24×24×19	3 — 24 ×		6 — 24×		6 24 ×	24×19
Cartridge Filters	4 12 × 24 × 12	4 — 12 ×		2 - 12 ×			24×12
	$3 - 24 \times 24 \times 12$	3 — 24×		6 — 24 ×		6 — 24 ×	24×12
.	4 — 12×24×2	4 — 12 ×			24×2	5 — 12 x	24×2
Prefitters (For Bag & Cartridge) "77		3 — 24×	24×2	6 24 ×		6-24×	
-	3 — 24×24×2	3 — 44 ^			.0		
Face Area (Ft²)	20.0	20.		28			.0
Face Area (Ft²)	20.0	20.					0
Face Area (Ft²)	20.0	20.	0	50	Fire.		F -
Face Area (Ft²) tanderd Unit Minimum Outside A	20.0 ir Temperature For Mech	20.1 enical Cooling	0 F	50		55	F
Face Area (Ft ²) tanderd Unit Minimum Outside A Without Hot Gas Option With Hot Gas Option	20.0 ir Temperature For Mech 55 F 55 F	20.0 enical Cooling 50	0	50 50	F ****	55	
Face Area (Ft ²) Standard Unit Minimum Outside A Without Hot Gas Option	20.0 ir Temperature For Mech 55 F 55 F	20.1 enical Cooling 50 50	0 F	50 50	F=	55 55	F

General Dàta

Table 10-1 — General Data — 90-130 Ton

	90	Ton	105	Ton	115	Ton	130	Ton
Compressor Data						ion	130	
Number/Size (Nominal)	2/40	Tion	1/40 Tion	, 1/50 Ton	2/50	Ton	260	Tion
Model	Mod	let R	Mor	del R		del R		del R
Unit Capacity Steps (%)	100/75	/50/25	100/7	8/44/22		V50/25		5/50/25
RPM	17!	50	17	750		50		750
Evaporator Fans								-30
Number/Size/Type	2/27	T/FC	2/27	MFC	2/27	"/FC	207	r"/FC
Hp Range	30-	80	30	-80		-80		
Cfm Range ¹	27,000-	45,000	31,000	-46.000		-46.000		-90 -46,000
TSP Range (in. WG)	1.0-4	1.75	1.0-	4.70		4.70		4.70
Exhaust Fans	50%	100%	50%	100%	50%	100%	50%	
Number/Size/Type	1/22"/FC	2/22"/FC	1/22"/FC	2/22"/FC	1/22"/FC	2/22"/FC	1/22"/FC	2/22"/FC
Hp Range	15	15-40	15	15-40	15	15-40		
Cfm Range				24.000-40.000		24.000-40.000	15	15-40-#
ESP Range — (In. WG)	.25-2.5	25-2.5	.25-2.5	.25-2.5			,,	24,000-40,000
Condenser Fans	.20.20	2524	.252.3	.25-2.5	.25-2.5	.25-2.5	.25-2.5	25-2.5
Number/Size/Type	8/26*/	D	0.000	/Proo.		_		
Ho (Each)	1.0					Prop.		'/Ртор.
Cfm	59.2			.0 200		.0		.0
Cycle/Phase						222		267
Evaporator Coil — Standard	60	/3	6(2/3	60	V3	60)/3
Dimensions	122.0	. 70 0	100.0	74.05				
Size (Ft²)				k 71.25		71.25		< 71.25
Rows/Fin Series	3/1:	3.).4		.4).4
Tube Diameter/Surface				20	5/1			44 -
Evaporator Coil — High Capacity	½/Enh	encec	/2/ENF	anced	1/2/Enh	anced	1/4/Enh	anced
Dimensions — right Capacity								
Size (Pr²)	122.0 >			k 71.25		A 🖚		A <= ; ~
Hi-Capacity Rows/Fin Series	59. 5/14			.4	N			A =
Tube Diameter/Surface		• •		44		Α		A
Condenser Coil	1/s/Enha	ncea	'/2/ENN	anced	N/	Α	N/	Ά
Size (Ft ²)	45							
Rows/Fin Series/Tube Diameter		2 :		52 -		2		2 📆 💢 - 🛒
Electric Heat	3/156	778	4/15	6/ %	4/15	5/ %	4/150	5/ %
KW :	4.5					_		
Capacity Steps: CV/VAV		0 🛰		0 ●	19			0 89
Natural Ges Heat	3/1	<u> </u>	3	7	3/	1	3/	1 =
MBh Inout		0.~	40					
Capacity Steps: CV/VAV				00 æ-		oo ·		00 ≉
Filters		<u> </u>	2/	·	2/	<u> </u>	2/	1
Panel Filters								
NumberSize (Inches)	05.04		**					
Face Area (Ft²)	25-24x		25-24		25-24			24x2
Bag Filters	100			0.0		1.0		LO :-
Number/Size (Inches)	3-12x2			24x19	3-12x		3-12x	
	15-24x2		15-24x		15-24x			24x19
Cartridge Filters	3-12x2			24x12	3-12x		3-12x2	
Duelling Carpara Carrier	15-24-2		15-24x		15-24x			24x12 🗻 🕳
Prefilters (For Bag & Cartridge)	3-20x2		3-20x		3-20x			2402 🛷 🕳
P	15-24x2		15-24x		15-24x		15-24x	242
Face Area (Ft ²)	66.0			D		0		.0 ⊊: ~=:. *

	ARI Performance Data ¹					_
Tons -	Model ²	Capacity (MBh)	EER	<i>,</i>	IPLV ²	<u> </u>
	SAH0C2040Y**A**A****	218 🚁	9.0	J F.	11.8	7
	SXHCC2040Y**A**A*****	218 🚁	9.0	2:	11.8	4
~ -	SFHCC204LY**A**A****	218 =	8.9	æ	11.7	٠.
20 -	SEHCC204"Y"*A"*A"***	218 🗲	8.9	*	11.7	
	SUHCC204LY**A**A****	216 🔫	8.9	نب	11.6	*
	SSHCC204LY**A**A*****	218			11.7	

1

Table-40-3 - ARI Correction Multipliers

	Mode		v	M	Atipliers (%)	•	44
Option Description	Digit	_	Designator	Capacity	EER	IPLV WE	•
200/60/3 Voltage	8	,	<u> </u>	100 🚓	100 🕾	100-100	
230/60/3 Voltage	8	• •	F	101	99 🕶	99 🗫	
High Heat — Gas — High Heat — Steam — High Heat — Hot Water —	9 9 9	3 0		100 as 100 as 100 %	100 -46- 99 187- 99 -87-	98	7
Wire Mesh Filter 95% Bag filter 95% Cartridge Filter	13 13 13	*	8 D E	100 # 99 # 99 #	101 - 105 95 10 95 10 95 10	101. 91	1,17
100% Economizer	16		D	100	99 🔻	98 🗫	
High Capacity Coil	21		G	113	109 😤	107	- 677
High Efficiency Motor	21		L	100	101	101	-
Inlet Guide Vanes	21	_	Ν	100	99	99 🖜	

- Economizer Outdoor Air Damper Leakage (Of Rated Airflow)

	ΔP Across Dan	opers (In. WC)
	0.5 (ln.)	1.0 (ln.)
Standard "Low Leak"	1.5 %	2.5 %
Optional "Ultra Low Leak"	0.5 %	1.0 %

Table 40-1 — Supply Fan Performance WITHOUT INLET VANES — 40, 50 and 55 Ton "C" Style

Cfm								Total Stati	c Pressure							
Std	.25	50	.50	00	.7	50	1.0	000	1.2	250	1.5	500	1.7	750	2.0	000
<u>Ai</u> r	Rom	Bhp	Rom	8hp	Rom	8hp	Rom_	Bho	Rom	Bhp	Rom	Bho	Rom	Bho	Rom	Bhp
8000	290	.66	396	1.27	479	1.95	550	2.57	613	3.44	671	4.23	723	5.05	770	5.90
9000	298	.77	400	1.44	482	2.16	553	2.93	616	3.75	673	4.61	725	5.49	774	6.39
10000	311	.94	404	1.61	486	2.38	556	3.20	618	4.07	675	4.99	727	5.93	776	6.89
11000	329	1.16	409	1.79	490	2.63	559	3.50	621	4.41	677	5.37	729	6.37	778	7.40
12000	349	1.43	414	2.00	494	2.89	563	3.81	624	4.77	680	5.78	731	6.82	780	7.90
13000	370	1.75	424	2.26	499	3.16	567	4.15	628	5.16	683	6.21	734	7.30	782	8.43
14000	391	2.12	438	2.60	504	3.44	571	4.49	632	5.57	687	6.67	737	7.80	785	8.97
15000	413	2.54	455	3.01	510	3.77	576	4.86	636	5.99	690	7.15	741	8.33	789	9.55
16000	435	3.02	474	3.50	520	4.18	581	5.24	640	6.43	695	7.65	745	8.89	792	10.16
17000	457	3.54	494 -	4.06	534	4.68	586	5.65	645	6.89	699	8.17	749	9.47	796	10.79
18000	479	4.13	515	4.68	550	5.29	595	6.15	650	7.37	703	8.71	753	10.07	800	11.46
19000	501	4.78	536	5.38	569	5.98	607	6.76	656	7.89	708	9.27	758	10.70	804	12.14
20000	524	5.49	558	6.15	588	6.75	622	7.49	664	8.50	713	9.85	762	11.34	809	12.84
21000	546	6.28	580	7.00	608	7.61	639	8.32	676	9.25	719	10.49	767	12.00	813	13.57
22000	569	7.14	602	7.92	629	8.55	658	9.26	690	10.12	728	11.25	773	12.70	818	14.32
22500	580	7.60	613	8.40	640	9.05	667	9.76	698	10.60	734	11.68	776	13.07	820	14.70
23000	591	8.08	624	8.90	651	9.58	677	10.29	706	11.11	740	12.15	780	13.48	823	15.09
24000	614	9.10	646	9.97	672	10.70	697	11.41	724	12.22	754	13.19	789	14.41	829	15.93

Cfm								Total Stati	c Pressure	•						
Std	2.2	50	2.5	00	2.7	50	3.0	000	3.2	250	3.5	500	3.7	50	4.0	000
<u>Air</u>	_Rpm	Bhp	Rom	Bho	Rpm	Bhp	Rom	Bhp	Rpm	Bhp	Rom	Bhp	Rpm	Bho	Rom	Bhp
8000	814	6.80	854 -	7.73	892	8.69	927	9.67	961	10.66	993	11.67	1023	12.69	1053	13.71
9000	819	7.32	861	8.28	901	9.27	938	10.31	972	11.37	1006	12.45	1037	13.55	1068	14.67
10000	822	7.88	865	8.89	906	9.92	944	10.98	980	12.07	1015	13.20	1048	14.35	1079	15.53
11000	824	8.45	867	9.52	908	10.61	948	11.72	985	12.85	1021	14.00	1055	15.18	1087	16.40
12000	826	9.01	869	10.15	910	11.30	950	12.47	988	13.66	1024	14.87	1059	16.09	1092	17.34
13000	828	9.59	871	10.78	912	11.99	952	13.23	989	14.48	1026	15.75	1061	17.04	1095	18.34
14000	830	10.18	873	11.42	914	12.69	954	13.98	991	15.30	1028	16.63	1063	17.98	1097	19.35
15000	833	10.80	876	12.09	917	13.40	956	14.75	994 -	16.12	1030	17.51	1065	18.92	1099	20.35
16000	837	11.48	879	12.78	920	14.14	958	15.54	996	16.96	1032	18.40	1067	19.87	1101	21.36
17000	840	12.14	882 -	13.52	923	14.92	961	16.36	999 -	17.82	1035	19.32	1069	20.83	1103	22.38
18000	844	12.88	886 -	14.28	926	15.73	964 ≠	17.21	1002	18.72	1037	20.26	1072	21.82	1106	23.41
19000	848	13.60	890	15.08	930	16.58	968 ∸	18.11	1005	19.66	1040	21.24	1075	22.85	1108	24.48
20000	852	14.36	894 -	15.90	934	17.46	972	19.04	1008	20.64	1044	22.27	1078	23.92	1111	25.60
21000	857	15.15	898	16.75	938	18.37	976	20.00	1012	21.66	1047	23.33	1081	25.03	1114	26.75
22000	861	15.96	902	17.63	942	19.30	980	20.99	1016	22.70	1051	24.43	1085	26.18	1118	27.95
22500	864	16.38	905	18.07	944	19.78	982	21.50	1018	23.24	1053	25.00	1087	26.77	1120	28.57
23000	866	16.80	907	18.52	946	20.26	984	- 22.01	1020	23.78	1055	25.57	1089	27.37	1122	29.19
24000	871	17.66	912	19.45	951	21.25	988	23.06	1024	24.89	1059	26.73	1093	28.59	1125	30.47

Cfm				Total Static	Pressure -			
Std	4.25	50 .	4.50	0 =	4.79	501 E	5.0	00≟.
Air	RPM	BHP *	RPM	BHP -	RPM	BHP ·	RPM	BHP
8000	1081	14.75	1108	15.78	1134	16.83	1160 :	17.88
9000	1097	15.80 4	1125 表	16.94 =	1152	18.08 *		
10000	1109	16.73°°	1138 🗈	17.95	1166 -	19.18 :		
11000	1118 5	17.84 🖘	1148 😕	18.91				
12000	1124	18.61	1155 *	19.91				
13000	1128	19.65	1159 ~	20.99				
14000	1130	20.73	1162 🕾	22.12				
15000	1132	21.80 2	1164 ≇:	23.26				
16000	1134	22.86 =	1166 *	24.39				
17000	1136	23.94 -	1168 *	25.52				
18000	1138 -	25.03 7	1170 ≥	26.66				
19000	1141	26.15						
20000	1144 ~	27.30 *						
21000	1147	28.50						
22000	1150	29.74						
22500	1152 ~	30.38						
23000	1153 😂	31.03 -4						
24000	1157 "	32.36					•	

- Notes:

 1. Fan performance for 40, 50, and 55 ton "C" style rooftops is identical. However, note maximum motor hip size for each size. Contact your local Trans representative for information on oversized motors.

 2. Shaded arises at table extremes note non-standard Bhip or Ripm selection. Contact your local Trans representative for more information.

 3. Supply fan performance table includes internal resistance of rooftop. For total static pressure determination, system external static must be acided to appropriate component static pressure drops levelporator coil, filters, optional excendinger, optional exhaust fan, optional hearing system, optional cooling only extended casing, optional roof curb.

 4. Maximum Cfm (for UL, approval) as follows: 40 Ton 18,000 Cfm

 50 Ton 22,500 Cfm

 Mid-table s

 7. Maximum motor horsenower is 7.5 hp.

5. Minimum motor horsepower is 7.5 hp.
6. Maximum motor horsepower as follows: 40 Ton — 25 hp.
50 Ton — 30 hp.
55 Ton — 30 hp.

Mid-table shading indicates maximum motor horsepower divisions.

7. Maximum 7.5 hp through 15 hp motor Rpm is 1,141 Rpm.

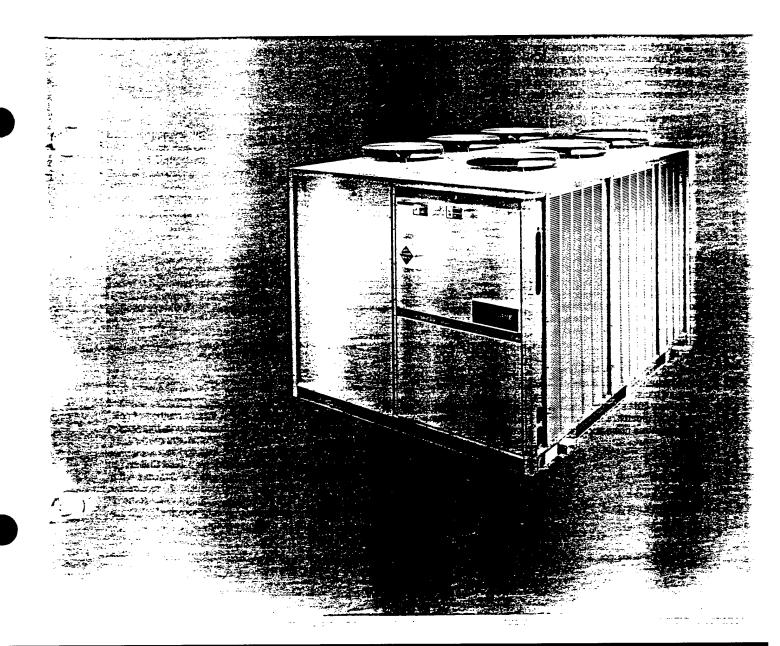
8. See RT-EB-81 for further details.



25 OF 41 ECO B-8 S/S-DS-1 September 1991 First Printing

Split System Condensing Units And Remote Chillers 20 through 120 Tons

70 TON UNITS SLOGS 205, 207, 200, 230, 229 20 00 000 5006 301 40 EN ONT BLOK 51 10 -10 CDIT ROBE 81





26 OF 41 ECO B-8

-BLDG 205 208 207 236 229

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T \$106 81

General

Data

T-1-04 0 15 1				j	3006	217	4		<u> </u>
Table 6-1 General Data	<u> </u>	on Conden	sing Units	4		₩	4		
Nominal Tonnage Model Number	20 RAUC-C20	25 RAUC-C25	30 RAUC-C30	40 RAUC-C40	50 RAUC-C50	60 RAUC-C60	80 RAUC-C80	100 RAUC-D10	120 RAUC-D12
Compressor Data								10-00-010	1000012
Туре	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Model R	Model R	Model R
Manifolded Sets								Semi-Hermetic	
Circuit #1	10T + 10T	10T + 15T	15T + 15T	10T + 10T	10T + 15T	15T + 15T	40T	50T	60T
Circuit #2	NA	N/A	N/A =	10T+10T	10T+15T	15T + 15T	40T	50T	60T :
Unit Capacity Steps (%)	100-50	100-40	100-50	100-75-50-25	100-80-60-30	100-75-50-25		٠	
No Control & VAV Option							100-75-50-25	100-67-50-33	100-67-50-33
EVP Option							100-75-50-25	100-83-67-	100-83-67-
								50-33-16	50-33-16
Condenser Fan Data									
Quantity/Fan Dia/Type	2/26"/Prop.	3/26"/Prop.	3/26"/Prop.	4/26"/Prop.	6/26"/Prop.	6/26"/Prop.	8/26"/Prop.	12/28"/Prop.	12/26"/Prop.
Fan Drive Type	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct
No. of Motors/Hp Each	2/1.0	3/1.0	3/1.0	4/1.0	6/1.0	6/1.0	8/1.0	12/1.0	12/1.0
Nominal Total Cfm	14000	18300	20900	28200	35600	40800	49600	66800	76000
Condenser Coil Data									
Number of Coils/Size (Inches)	1/63x71	1/71x 71	1/45x71 1/49x71	2/65x 70	2/51 x96	2/6 6x96	4/65 x70	4/51 x96	4/66x :96
Face Area (Sq. Ft.)	31.0	35.0	46.1	63.2	67.1	88.0	126.4	134.2	176.0
Rows/Fins Per Ft.	3/168	3/156	3/168 -	3/168	3/156	3/168	3/168	3/156	3/168
Condenser Storage Capacity (Lbs) (2)	67	76	96 🖚	136 ≍	142	184 🌤	272	284	368 Æ
efrigerant Deta									
No. Refrigerant Circuits	1	1	1	2	2	2	2	2	2
Refrigerant Type	R-22	R-22	R-22	R-22	R-22	R-22	R-22	R-22	R-22 ::
Refrigerant Operating Charge (Lbs) (1)	28 🤝	31	40 🚁	58 🖚	62 ≆	80 =	116	124	160 -€
linimum Outdoor Air Temper	sture For Me	echenical Co	oling						
Standard Ambient Operating Range (F)		40-115	40-115	40-115	40-115	40-115	40-115	40-115	40-115
Low Ambient Ontion (F)	0		^	^	^				

Operating charge is approximate for condensing unit only, and does not include charge for low eide or interconnecting lines
 Condenser storage capacity is given at conditions of 95 F outdoor temperature, and 95% full.

Table 6-2 — Evaporator Chillers — 20-120 Tons

						•										
Nominal Tonnage	20		25		30	٠.	40	٠.	50	60		80		100	 120	- .
No. Of Circuits	1		1		1		2		2	2		2		2	2	
Volume Shell (Gal) (1)	11.7	,	10.7	٠	16.3		13.8	•	21.0	18.5	А.	43.1	_	35.0	 47.9	· -
Tube Pull (in.) (2)	73	4	73		74		74		96	-				95		
Refrigerant Operating Charge ~ (Lhs) (3)	8	700	10	Ľ	12	7	16									

Notes

1. Shell volume is for weterside only.

3. Operating charge is approximate and for the evaporator chiller only.

Table 6-3 — EER Date — Condensing Unit Only (1)

Nominal	Model:==	Net *** Capacity**	Total Unit	Condenser Fan	Control	Condensi	ng Unit -	. 12
Tonnage	Number ···	(MBH)	KW =	Each/Total	KW ★	Total KW	EER ≈	
20	RAUC-C20	239 🤏	20.1~	0.9/1.8	0.25 :∌	22.2 =	10.8 🐲	_
25	RAUC-C25	312 -	26.0 *	0.9/2.7	0.25 😙	29.0 🕾	10.8 🖜	
30	RAUC-C30	374	31.2	0.9/2.7	0.25	34.2	10.9 👄	
40	RAUC-C40	506 ∞≉	40.2 #	0.9/3.6	0.40 🌣	44.2 :	11.4 %	
50	RAUC-C50	621 ^	52.4 -	0.9/5.4	0.40 -	58.2	10.7 =	
60	RAUC-C60	744	62.8 ·	0.9/5.4	0.40 ≈	68.5 ~	10.8 🌤	_
80	RAUC-C80	1049 =	91.6 -	0.9/7.2	0.50 -:	99.3	10.6	
100	RAUC-D10	1337	109.0=	0.9/10.8	0.50 -	120.3	11.1	
120 😁	RAUC-D12	1633	133.8 🐭	0.9/10.8	0.50 >	145.1	11.3 🤼	

1. Condensing unit only retings are per ARI 395. Full load retings are at 95 F entering air temperature, and refrigerant conditions entering the condensing unit of 45 F seturated and 60 F actual temperature. Part load ratings are at 80 F entering air temperature and refrigerant conditions entering the condensing unit of 50 F seturated auction and 65 F actual temperature. For use of 200/230 volt unit in 230 volt applications: increase capacity rating by 1%, increase power by 1.5% and decrease efficiency by 1%. All expectly, two and EER figures are at conditions of 45 F-seturated suction temperature at the compressor and 95 F emblant.—

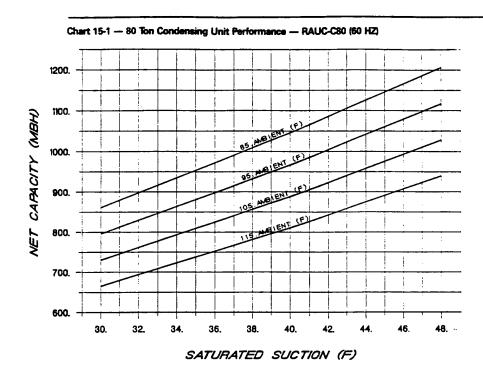
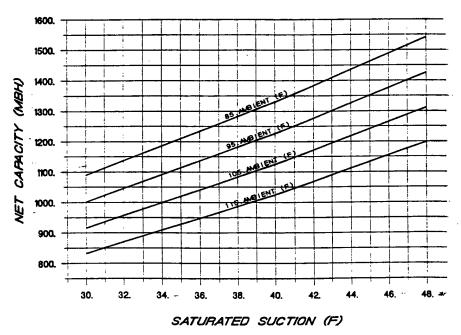


Chart 15-2 — 100 Ton Condensing Unit Performance — RAUC-D10 (60 HZ)



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Electrical Data

Table 19-1 — Condensing Units

				Unit Charac	teristics		
Nominal Tons	Model Number	Voltage/Start Characteristics	Allowable Voltage Utilization Range	Minimum Circuit Ampacity (3), (6)	Maximum Fuse Size (4), (6)	Recommended Dual Element Fuse Size (5), (6)	Number Of Compressors
	RAUC-C20G	200-230/60/3XL	180-220/208-254	101	125	125	2
20	RAUC-C204	460/60/3XL	416-508	44	60	50	5
	RAUC-C205	575/60/3XL	520-635	35	45	40	5
	RAUC-C25G	200-230/60/3XL	180-220/208-254	129	175	150	2
25	RAUC-C254	460/60/3XL	416-508	56	80	70	5
	RAUC-C255	57 5/60/3 XL	520-635	45	60	60	2
	RAUC-C30G	200-230/60/3XL	180-220/208-254	148	200	175	2
30	RAUC-C304	460/60/3XL	416-508	65	90	80	2
	RAUC-C305	57 5/60/3XL	520-635	52	70	50	5
	RAUC-C40G	200-230/60/3XL	180-220/208-254	192	225	225	
40	RAUC-C404	460/60/3XL	416-508	84	100	225 90	4
	RAUC-C405	575/60/3XL	520-635	67	80	50 80	4
	RAUC-C50G	200-230/60/3XL	180-220/208-254	244	300	300	
50	RAUC-C504	460/60/3XL	416-508	106 ·	125 ·	300 125	4
	RAUC-C505	57 5/60/3XL	520-635	85	100	90	4
	RAUC-C60G	200-230/60/3XL	180-220/208-254	282	300	300	- 4
60	RAUC-C604	460/60/3XL	416-508	123	125	300 125	4
	RAUC-C605	575/60/3XL	520-635	98	110	110	4
	RAUC-C802	575/60/3PW	520-635	137	175	175	
	RAUC-C803	230/80/3PW	208-254	343	450	400	.
80	RAUC-C804	460/60/3XL	416-508	171	225	200	5
	RAUC-C805	57 5/60/3 XL	520-636	137	175	175	2
	RAUC-C806	200/60/3PW	180-220	394	500	450	5
	RAUC-D102	575/60/3PW	520-636	155	200	175	
	RAUC-D103	230/60/3PW	208-254	390 ↔	500 ::	450	5
100	RAUC-D104	460/60/3XL	416-508	195 :-	250	225	5
	RAUC-D105	57 5/60/3XL	520-635	155	200 -	175	2
	RAUC-D106	200/ 60/3PW	180-220	448	600	500	ž
	RAUC-D122	57 5/60/3PW	52 0-63 5	191	250	225	2
100	RAUC-D123	230/60/3PW	208-254	480≖	600	600	2
120	RAUC-D124	460/ 80 /3XL	416-508	240 🗢	300 🖈	300	2
	RAUC-D125	575/60/3XL	520 -63 5	191 ≖	250 ₹	225 -	2
	RAUC-D126	200/60/3PW	180-220	551	700	700	2

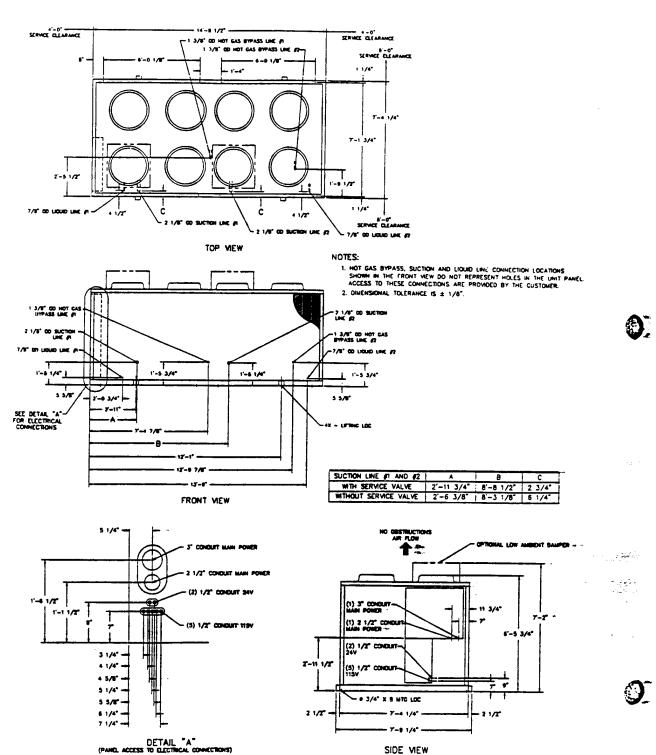
Table 19-2 — Compressor Motor And Condenser Fan Data

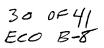
Vominal			Compres	sor A (7)	Compre	ssor 8	Compre	ssor C	Compre	seor D	Condense	r Fans
Tons	Model	Voltage	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	Qtv.	FLA
		200/230 XL	41.4	247	41.4	247					2	4.1
20	RAUC C20	460	18.1	95	18.1	95	_		_	_	2	1.8
		575	14.4	76	14.4	76 -		-	_	_	2	1.4
		200/230 XL	60.5	376	41.4	247					3	4.1
25	RAUC C25	460	26.3 -	142	18.1 -	95		_	_	_	3	1.8
		575	21.0	114	14.4	76	_	_	_	_	3	1.4
		200/230 XL	60.5	376	60.5	376					3	4.1
30 ~	RAUC C30	460	26.3	142 🎞	26.3	142 =	_		_	_	ă	1.8
		575	21.0	114	21.0	114 -			_	_	3	1.4
		200/230 XL	41.4	247.	41.4	247	41.4	247 🚁	41.4	247	4	41
40 ≠	RAUC C40	460	18.1 ~	95 🕶	18.1	95 🤏	18.1	95 4	18.1	95 =	4	1.8
		575	14.4	76	14.4	76	144	78 -	144	76	7	1.4
		200/230 XL	60.5	376 -∺	41.4	247	60.5	376 ≠	41.4	247	6	41 -
50 ₹	RAUC C50	460	26.3	142 🖘	18.1 -	95 🕶	26.3	142 =	18.1	95	. A	1.8
		575 ·	21.0	114 -	14.4	76	21.0	114	14.4	76	6	1.4
		200/230 XL	60.5	376 =4:	60.5	376	60.5	378 -	60.5	376 -	6	41 *
ھہ 60	RAUC C80		26.3	142 🐟	26.3	142 🖛	26.3	142 #	26.3	142 📆	6	1.8
		575	21.0	114	21.0	114	21.0 -	114 -	21.0	114	6	1.4
			(1)	(2)								
		200 PWS	160.3	430/729	_						g ==-	413
		230 PWS	139.4	375/631	_						8 8	3.6
80	RAUC C80	460 XL	69.7	315	_				_		8	1.8
		575 PWS	55.8	150/246	_	_			_		8 4	1.4
		575 XL	55.8 ≖	.خـ. 245			-		-	_	8	1.4
		200 PWS	177.1	550/910	_						12	41
		230 PWS	154.0	480/792		_	_		_	_	12 -	41
100	RAUC D10		77.0 :	396 ↔			_				12 -	1.8
		575 PWS	61.6	190/315	_						12 ~	1.4
		575 XL	61.6 -	315 -							12 😤	1.4
		200 PWS	223.1	620/980	_	·	_		_	_	12	41 .
100 77		230 PWS	194.0 -	535/880	_ ~		_		-		12	3.6.4
120 🕮	RAUC D12		97.0	430		- ·-		 .	_	_	12 😁	1.8
		575 PWS	77.6	220/346			_	_	_	-	12	1.4
		575 XL	77.6	346 🚓		_	_	-			12	14

Dimensional Data



Figure 26-1 — Air-Cooled Condensing Unit — RAUC 80 Ton



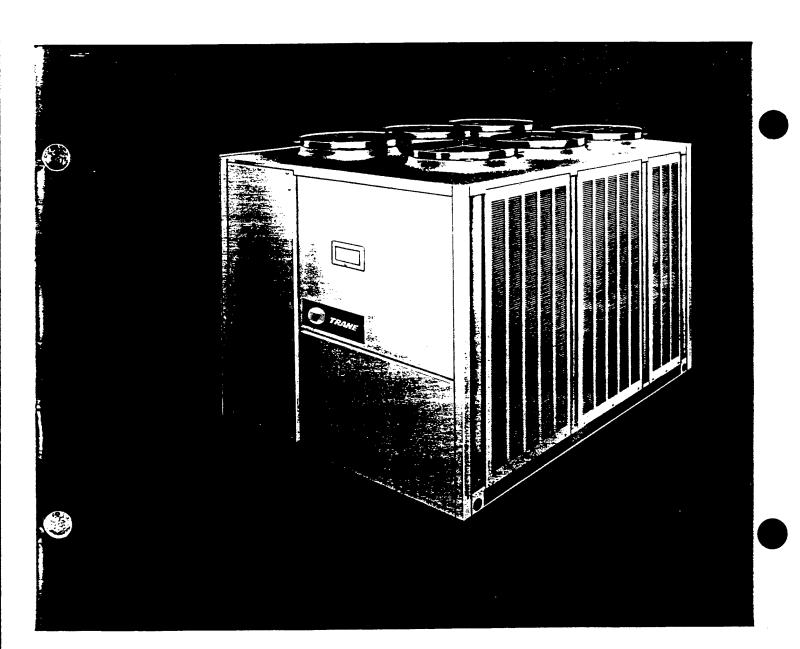




CG-DS-1 September 1992

Air-Cooled Liquid Chillers

10 through 120-Tons 720 5 101 20 TON UNIT





General Data

BLD6 101 7 BLD65 210, 290

Table	14-1	_	General	Data	_	10-60	Ton Units	

			1	7				
Model Number	10 Ton	15 Ton	20 Ton	25 Ton	30 Ton	40 Ton	50 Ton	60 Ton
Compressor Data	CGA120	CGA 180	CGAD-C20	CGAD-C25	CGA D-C30	CGAD-C40	CGAD-C50	CGAD-C60
Model	CT			.				
Quantity	Climatuff™	Trane H	Scroll	Scroll	Scroff	Scroll	Scroll	Scroll: -
·	2	2	2	1/1	2	4	2/2	4
Nominal Tons Per Compressor Evaporator	5	7.5	10	10/15	15	10	10/15	15 🗝
•								
Nominal Size (Tons)	10	15	20	25	30 .	40 ~	50	60 🐲
Water Storage Capacity (Gallons) (2)	1.4 -	1.5	11.7	10.7	16.3	13.8	21.0	18.6 ≠
Min. Flow Rate (GPM)	12.0	18.0	24	30 ≟	36 -	48	60	72 🍜
Max. Flow Rate (GPM)	36.0	54.0	72	90	108	144	180	216 🐃
Max EWT At Start-Up — Dog F (3)	100	100	108	108	108	108	108	108
Condenser								
Nominal Size (Tons)	10	15	20	25	30	40	50	60 🚅
Number of Coils	1	2	1	1	2	2	2	2
Coil Size (ea., Inches) ⁴	28 x 108	28 x 83	55 x 71	61 x 71	45 x 71/35 x 71	56 x 70	44 x 96	57 x 96
Number of Rows	2	2	3	3	3	3	3	3
Subcooler Size (ea., Inches)	4 x 108	4 x 83	8 x 71	10 x 71	14 x 71	9 x 70	7 x 96	9 x 96
Condenser Fans								
Quantity	1	2	. 2	3	3	4	6	6
Diameter (Inches)	28"~	26" -	26	26	26	26	26	26 -=
CFM (Total)	8,120	11,600	14,000	18,300	20,900	28.200	35,600	40,800 :4:
Nominal RPM	1100 🦘	1100	1140 -	1140	1140 -	1140	1140	1140
Tip Speed (Ft/Min)	8080	7490 ~	7750	7750	7750	7750	7750	7750 ≅
Motor HP (ea.)	1	1/2	1.0	1.0	1.0	1.0	1.0	1.0
Drive Type	Direct	Direct	Direct	Direct	Direct	Direct	Direct	Direct
Minimum Outdoor Air Temperature Permissib For Mechanical Cooling (1)	to ·							
Standard Ambient Control Unit (Deg. F)	50 🥗	45 🕏	30 ₩	30 🖘	30	30 ·	30	30 ≆≕
Standard Ambient with Hot Gas Bypass (Deg. F)	60 ≯	60 -	40 =	40 Ac	40	40	40	40 奪
Low Ambient Option (Deg. F)	0 *	0	0 -	0 -	0	0	C	0 🕹
Low Ambient Control With Hot Gas Bypass (Deg. F)	15 🤏	15 🖘	10 🥦	10 🛎	10	10 -	10	10 🖦
General Unit								· · · · · · · · · · · · · · · · · · ·
Unload Steps	100-50	100-50	100-50	100-60-40	100-50	100-75-50-25	100-80-60-30	100-75-50-25
No. of Independent Refrigerant Circuits	2	2	1	1	1	2	2	2 :
Refrigerant Charge (tbs. R22/Circuit)	9.5 ≱	12.4	36.5	41.5	60.0	76.0 😭	76.0	100.0:30%
Oil Charge (Pints/Circuit)	42 -	7.5	8.0	8.0/14.0	14.0	8.0	8.0/14.0	14.0 🕸

^{*}Unloading steps depend upon which compressor is lead compressor

⁽¹⁾ Minimum start-up ambient based on unit at minimum eten of univerties and a 5 meth wind access the endorse.

⁽²⁾ includes piping internet to chiller—

⁽²⁾ includes piping internet t (3) At 95 Fambient. ~

⁽³⁾ At 30 P ampient. ~

(4) Does not include subconline nection of coll



to-00 Tur Full Load

Table 26-1 — 10 Ton — CGA 120

apacity	75													
anacity				_85			95			105			115	
(Tons)	input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input	EER
9.2	8.6	11.6	8.7	9.2	10.2	8.2	9.8	9.1	7.6	10.3	8.1			7.1
9.5	8.7	11.8	9.0	9.3	10.5	8.5	9.9	9.3						7.2
9.8	8.8	12.0	9.3	9.5	10.7		10.1							7.4
10.0	8.9	12.2	9.5	9.5										7.4
10.2	8.9	12.3												
	9.0	12.5												7.5
	9.1	12.8												7.6
														7.7
														8.0 8.2
(9.2 9.5 9.8	9.2 8.6 9.5 8.7 9.8 8.8 10.0 8.9 10.2 8.9 10.5 9.0 10.8 9.1 11.6 9.4	92 8.6 11.6 95 8.7 11.8 9.8 8.8 12.0 10.0 8.9 12.2 10.2 8.9 12.3 10.5 9.0 12.5 10.8 9.1 12.8 11.6 9.4 13.3	92 8.6 11.6 8.7 95 8.7 11.8 9.0 9.8 8.8 12.0 9.3 10.0 8.9 12.2 9.5 10.2 8.9 12.3 9.6 10.5 9.0 12.5 9.9 10.8 9.1 12.8 10.2 11.6 9.4 13.3 11.0	9.2 8.6 11.6 8.7 9.2 9.5 8.7 11.8 9.0 9.3 9.8 8.8 12.0 9.3 9.5 10.0 8.9 12.2 9.5 9.5 10.2 8.9 12.3 9.6 9.6 10.5 9.0 12.5 9.9 9.8 10.8 9.1 12.8 10.2 9.9 11.6 9.4 13.3 11.0 10.2	9.2 8.6 11.6 8.7 9.2 10.2 9.5 8.7 11.8 9.0 9.3 10.5 9.8 8.8 12.0 9.3 9.5 10.7 10.0 8.9 12.2 9.5 9.5 10.8 10.2 8.9 12.3 9.6 9.6 10.9 10.5 9.0 12.5 9.9 9.8 11.1 10.8 9.1 12.8 10.2 9.9 11.3 11.6 9.4 13.3 11.0 10.2 11.8	9.2 8.6 11.6 8.7 9.2 10.2 8.2 9.5 8.7 11.8 9.0 9.3 10.5 8.5 9.8 8.8 12.0 9.3 9.5 10.7 8.8 10.0 8.9 12.2 9.5 9.5 10.8 8.9 10.2 8.9 12.3 9.6 9.6 10.9 9.0 10.5 9.0 12.5 9.9 9.8 11.1 9.3 10.8 9.1 12.8 10.2 9.9 11.3 9.6 11.6 9.4 13.3 11.0 10.2 11.8 10.4	9.2 8.6 11.6 8.7 9.2 10.2 8.2 9.8 9.5 8.7 11.8 9.0 9.3 10.5 8.5 9.9 9.8 8.8 12.0 9.3 9.5 10.7 8.8 10.1 10.0 8.9 12.2 9.5 9.5 10.8 8.9 10.2 10.2 8.9 12.3 9.6 9.6 10.9 9.0 10.3 10.5 9.0 12.5 9.9 9.8 11.1 9.3 10.4 10.8 9.1 12.8 10.2 9.9 11.3 9.6 10.6 11.6 9.4 13.3 11.0 10.2 11.8 10.4 11.0	9.2 8.6 11.6 8.7 9.2 10.2 8.2 9.8 9.1 9.5 8.7 11.8 9.0 9.3 10.5 8.5 9.9 9.3 9.8 8.8 12.0 9.3 9.5 10.7 8.8 10.1 9.5 10.0 8.9 12.2 9.5 9.5 10.8 8.9 10.2 9.5 10.2 8.9 12.3 9.6 9.6 10.9 9.0 10.3 9.6 10.5 9.0 12.5 9.9 9.8 11.1 9.3 10.4 9.8 10.8 9.1 12.8 10.2 9.9 11.3 3.6 10.6 10.0 11.6 9.4 13.3 11.0 10.2 11.8 10.4 11.0 10.4	9.2 8.6 11.6 8.7 9.2 10.2 8.2 9.8 9.1 7.6 9.5 8.7 11.8 9.0 9.3 10.5 8.5 9.9 9.3 7.9 9.8 8.8 12.0 9.3 9.5 10.7 8.8 10.1 9.5 8.1 10.0 8.9 12.2 9.5 9.5 10.8 8.9 10.2 9.5 8.3 10.2 8.9 12.3 9.6 9.6 10.9 9.0 10.3 9.6 8.4 10.5 9.0 12.5 9.9 9.8 11.1 9.3 10.4 9.8 8.7 10.8 9.1 12.8 10.2 9.9 11.3 3.6 10.6 10.0 9.0 11.6 9.4 13.3 11.0 10.2 11.8 10.4 11.0 10.4 9.7	9.2 8.6 11.6 8.7 9.2 10.2 8.2 9.8 9.1 7.6 10.3 9.5 8.7 11.8 9.0 9.3 10.5 8.5 9.9 9.3 7.9 10.5 9.8 8.8 12.0 9.3 9.5 10.7 8.8 10.1 9.5 8.1 10.7 10.0 8.9 12.2 9.5 9.5 10.8 8.9 10.2 9.5 8.3 10.8 10.2 8.9 12.3 9.6 9.6 10.9 9.0 10.3 9.6 8.4 10.9 10.5 9.0 12.5 9.9 9.8 11.1 9.3 10.4 9.8 8.7 11.1 10.8 9.1 12.8 10.2 9.9 11.3 9.6 10.0 9.0 11.3 11.6 9.4 13.3 11.0 10.2 11.8 10.4 11.0 10.4 9.7 11.8	92 8.6 11.6 8.7 92 102 8.2 9.8 9.1 7.6 10.3 8.1 9.5 8.7 11.8 9.0 9.3 10.5 8.5 9.9 9.3 7.9 10.5 8.2 9.8 8.8 12.0 9.3 9.5 10.7 8.8 10.1 9.5 8.1 10.7 8.4 10.0 8.9 12.2 9.5 9.5 10.8 8.9 10.2 9.5 8.3 10.8 8.4 10.2 8.9 12.3 9.6 9.6 10.9 9.0 10.3 9.6 8.4 10.9 8.5 10.5 9.0 12.5 9.9 9.8 11.1 9.3 10.4 9.8 8.7 11.1 8.6 10.8 9.1 12.8 10.2 9.9 11.3 9.6 10.6 10.0 9.0 11.3 8.8 11.6 9.4 13.3 11.0 10.2	Cons. KW EER (Tons. KW EER (Tons	Tons KW EER Tons KW EER Tons KW EER Tons KW EER Tons KW 9.2 8.5 11.6 8.7 9.2 10.2 8.2 9.8 9.1 7.6 10.3 8.1 7.0 10.8 9.5 8.7 11.8 9.0 9.3 10.5 8.5 9.9 9.3 7.9 10.5 8.2 7.3 11.0 9.8 8.8 12.0 9.3 9.5 10.7 8.8 10.1 9.5 8.1 10.7 8.4 7.5 11.3 10.0 8.9 12.2 9.5 9.5 10.8 8.9 10.2 9.5 8.3 10.8 8.4 7.7 11.4 10.2 8.9 12.3 9.6 9.6 10.9 9.0 10.3 9.6 8.4 10.9 8.5 7.8 11.5 10.5 9.0 12.5 9.9 9.8 11.1 9.3 10.4 9.8 8.7 11.1 8.6 8.0 11.7 10.8 9.1 12.8 10.2 9.9 11.3 9.6 10.6 10.0 9.0 11.3 8.8 8.3 11.9 11.6 9.4 13.3 11.0 10.2 11.8 10.4 11.0 10.4 9.7 11.8 9.1 9.0 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5 13.6 13.7 13.8 13.3 13.0 10.2 11.8 10.4 11.0 10.4 9.7 11.8 9.1 9.0 12.5 13.7 13.7 13.7 13.8 13.8 13.8 13.8 13.8 13.8 14.8 15.8

Table 26-2 — 15 Ton — CGA 180

					E	ntering	Condenser A	Air Tempe	rature (C	Degrees F)					
	-	75			85			95			105			115	
LWT (Deg F)	Capacity (Tons)	input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tons)	input KW	EER
40	15.6	14.9	11.7	14.5	15.7	10.4	13.4	16.3	9.3	12.3	16.8	8.2	11.2	17.3	7.3
42	16.1	15.2	11.9	15.0	16.0	10.6	13.9	16.7	9.4	12.8	17.3	8.4	11.6	17.8	7.4
44	16.7	15.5	12.1	15.6	16.4	10.7	14.4	17.0	9.6	13.3	17.7	8.5	12.1	18.2	7.5
45	17.0	15.7	12.2	15.8	16.5	10.8	14.7	17.3	9.6	13.5	17.9	8.6	12.3	18.4	
46	17.2	15.8	12.3	16.1	16.7	10.9	14.9	17.5	9.7	13.8	18.1	8.6	12.6	18.7	7.6
48	17.8	16.1	12.4	16.6	17.0	11.0	15.5	17.8	9.8	14.3	18.5	8.7	13.0		7.7
50	18.4	16.4	12.6	17.2	17.4	11.2	16.0	18.2	9.9	14.8	18.9	8.9	13.5	19.1	7.8
55	19.8	17.2	13.0	18.6 -	18.2	11.6	17.3	19.2	10.3	16.0	20.0	9.1	14.7	19.6	7.9
60	21.3	18.0	13.4	20.0	19.1	11.9	18.6	20.1	10.6	17.3	21.1	9.4	16.0	20.8 21.9	8.1 8.3

Table 26-3 — 20 Ton — CGAD-C20

						ntenng	Condenser A	ur Tempe	rature (C	Degrees F)					
		75			85			95			105			115	
LWT (Deg.F)	Capacity (Tons)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tops)	Input KW	EER	Capacity (Tons)	Input KW	EER	Capacity (Tops)	Input	EER.
40	18.7	16.0	12.3	17.8	17.7	10.7	16.8	19.6	9.2	15.8	21.8	7.9	14.7	24.2	6.7
42	19.3	16.2	12.6	18.4 -	17.9	11.0	17.4 -	19.8	9.5	16.3	22.0	8.1	15.3	24.4	6.9
44	19 .9	16. 3	12.9	19.0	18.1	11.2	18.0	20.0	9.7	16.9	22.2	8.3	15.8	24.6	7.1
45	20.3	16.4	13.1	19.3	18.1	11.4	18.2	20.1	9.8	17.2	22.3	8.4	16.1	24.8	7.2
46	20.6	16.5	13.2	19.6	18.2	11.5	18.5	20.2	9.9	17.5	22.4	8.5	16.3	24.9	7.3
48	21.2	16.6	13.5	20.2	18.4	11.8	19.1	20.4	10.2	18.0	22.6	8.7	16.9	25.1	
50	21.9	16.8	13.8	20.8	18.6	12.0	19.7	20.6	10.4	18.6	22.8	8.9	17.5		7.4
55	23.5	17.2	14.5	22.4	19.0	12.7	21.3	21.1	11.0	20.1	23.4	9.5		25.3	7.6
60	25.3	17.7	15.3	24.1	19.5	13.3	22.9	21.6	11.6	21.7	23.9	10.0	18.9	25 .9	8.1

Table 26-4 — 25 Ton — CGAD-C25

	Entering Condenser Air Temperature (Degrees F)													
	75		85		95 😔		105 🕶		115 %					
(Deg F)	Capacity (Tons)	Input KW EER	Capacity (Tons)	input ~ KW · EER	Capacity (Tons)	Input EER	Capacity (Tons)	Input EER	Capacity	Input KW EER				
40 · · · · · · · · · · · · · · · · · · ·	23.3 24.0 24.8 25.2 25.6 26.4 27.2 29.3	21.5 12.5	22.2 22.9 23.6 24.0 24.4 25.2 26.0 27.8	22.9 - 10.2 23.1 10.5 23.4 10.7 23.5 10.8 23.6 11.0 23.9 11.2 24.1 11.5 24.8 12.1	21.0 21.7 22.4 = 22.8 23.1 23.9 24.6 = 26.5 = 3.1	25.0	19.8	28.0 7.6 28.3 7.8 28.5 8.0 28.7 8.1 28.8 8.2 29.1 8.4 29.3 8.6	18.5	31.0 6.5 31.3 6.7 31.5 6.9 31.7 6.9 31.8 7.0 32.1 7.4 32.4 7.4 32.4 7.4 32.4 7.4 32.4 32.4 32.4 32.4 32.4 32.4 32.4 32				

Table 26-5 - 30 Ton - CGAD-C30

				Entering	Condenser A	ir Temperature (D	egrees F)				
	75		85			95		105	115 -		
LWT (Deg F)	Capacity (Tons)	Input KW EER	Capacity (Tons)	Input KW == EER	Capacity (Tons)	Input KW & EER -	Capacity	Input . KW = EER	Capacity	input KW = EER =	
40 42 44 45 46 48 50 55 60	27.9 28.8 29.8 30.3 30.7 31.7 32.7 35.2 37.9	24.4 12.2 24.8 12.5 24.9 12.8 25.0 12.9 25.2 13.1 25.4 13.3 25.7 13.6 26.4 14.3 27.1 15.1	26.8 27.5 28.5 28.9 29.4 30.3 31.3 33.7 36.3	27.0 10.6 27.2 10.9 27.5 11.2 27.7 11.3 27.8 11.4 28.1 11.7 28.4 11.9 29.1 12.6 29.9 13.2	25.3 26.2 27.1 27.5 27.9 28.8 32.1 34.6	29.8 = 9.2 30.1 = 9.5 30.4 = 9.7 30.6 = 9.8 30.7 = 9.9 31.0 = 10.1 31.3 = 10.4 32.1 = 10.9	23.9 = 24.7 = 25.6 = 26.0 ± 27.3 = 28.2 = 30.5	33.0 - 8.0 33.3 - 8.2 33.6 < 8.4 33.8 - 8.5 34.0 - 8.6 34.3 - 8.6 34.6 - 9.0 35.4 : 9.5	22.4 23.2 24.0 24.4 24.8 25.7 26.5 28.7	365 68 368 7.0 37.2 7.2 7.3 37.3 7.3 37.5 7.3 38.2 7.5 38.2 7.7 39.1 8.2 3	

ed on a 0.0005 fouling factor at see level per ARI standard 590-61, 10-15 ton ratings based on 0.00025 fouling factor per ARI 590-86.

Notes:

1. 20-30 ton ratings based on a 0.0005 fouling factor at see level per ARI standard 590-81, 10-15 ton ratings based on 0.00 2. Interpolation between points as permasible.

3. Extrapolation between points as permasible.

4. Kw input is for compressors only.

5. EER = Energy Efficiency Ratio, (Btu/west-hourt, Power inputs include compressors, condenser tens and control power.

6. Ratings are based on an evaporator temperature drop of 10 F.

7. Derate capacity 1% for 208 volt ceprasion of 208-230 dual voltage units.

10-80 Tons Part Loac

	•				Entering	Condenser Air	Temperature (D			
Tons	Model Number	-	95 100% Load	87 80% Load	85 75% Load	79 60% Load	75 50% Load	71 40% Load	67 30% Load	65 マ 25% Loed
		EER	9.5		_		11.6	_	_	-
10	CGA 120	Capacity (Tons)	8.8	-		_	4.8	_	-	_
		KW Input	10.1				4.0			
		EER	9.6		_		11.1	-	_	
15	CGA 180	Capacity (Tons)	14.4	_	_	_	7.6	_	-	
		KW Input	17.0				7.1			
		EER	9.7	_	_	_	13.9	_	_	
20	CGAD-C20	Capacity (Tons)	18.0	_	_	_	10.8	_	_	_
		KW Input	20.0				7.1			
		EER	9.3		_	12.5	_	13.7	_	-
25	CGAD-C25	Capacity (Tons)	22.4	_	_	15.3	_	11.2	_	
		KW Input	25.8			11.6		6.7		
		EER	9.7	-	_	_	14.0	_	_	-
30	CGAD-C30	Capacity (Tons)	27.1	_	_	_	16.0	-	_	_
		KW Input	30.4				10.6			
		EER	9.7	_	11.2	_	14.1	_	_	15.0
40	CGAD-C40	Capacity (Tons)	35.2	_	28.1	-	21.4	-	_	10.9
		KW Input	39.6		25.4		14.0			6.4
		EER	9.3	10.8		12.6	_	-	14.0	-
80	CGAD-C50	Capacity (Tons)	44.4	37.8	_	30.6	_	-	15.7	_
		KW Input	51.6	35.4		23.2			10.2	
		EER	9.5	_	11.1	_	14.1		_	15.2
60	CGAD-C60	Capacity (Tons)	52.7	_	41.8	_	31.9	-	_	16.3 -
		KW Input	60.8		39.0		21.2			9.6
		EER	9.9		10.5	_	11.8	_	_	13.4
70	CGAC-C70	Capacity (Tons)	62.5	_	50.8	_	34.3	_		21.6
		KW Input	70.0		52.6		31.8			16.4
		EER	9.7	_	10.6	-	12.1	_	_	13.3
80	CGAC-C80	Capacity (Tons)	73.9	-	62.0		40.7	-		25.1:3
		KW Input	83.4	_	61.6		36.2			18.3

Notes:

1. Table 29-1 data is rated in accordance with ARI Standard 590-81, Section 7.3.

4.4 F leaving chilled water temperature.

(55 F + 0.4 F x K load) — entering ambient temperature.

— Constant evaporator waterflow as determined at full load operation at 95 F ambient and 10 F evaporator temper

— % Load by compressor deplecement as defined by ARI Standard 590-81.

2. Kw inout is for compressors only.

3. EER — Energy Efficiency Ratio, (Btu/watt-hour). Power inputs include compressors, condenser fans and control power.

90-129 Tone Part Load

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Table 30-1 — Part Load Data, ARI Points (90-120 Tons)

					Entering Conde	nser Air Tempera	ture (Degrees F)		
Tons	Model Number		95 100% Load	88.3 83% Load	87.8 82% Load	86.2 78% Load	81.6 67% Load	80.6 64% Load	77.4 56% Load
90	CGAC-C90	EER Capacity (Tons)	10.0 85.9	_	=	10.8 73.2	-	-	12.3 -
		KW Input	92.9	_	_	70.5	_	_	51.4 <i>≕</i> 44.3
100	CGAC-D10	EER Capacity (Tons) KW Input	10.1 94.5 100.4	11.1 86.6 82.6	=======================================	_	10.9 71.4 64.4	-	-
110	CGAC-D11	EER Capacity (Tons) KW Input	10.3 105.6 112.3	-	11.3 95.5 90.5			11.1 76.6 69.1	=
120	CGAC-D12	EER Capacity (Tons) KW Input	10.2 114.2 122.6	11.2 104.0 100.7	=		10.9 85.2 79.0	-	

Table 30-2 — Part Load Data, ARI Points (90-120 Tons)

					Entering	Condenser Air	Temperature (D	egrees F)		
Tons	Model Number		75 50% Load	73 45% Load	69.8 37% Load	68.3 33% Load	67 30% Load	62.6 19% Load	61.6 17% Load	61 15% Load
90	CGAC-C90	EER Capacity (Tons) KW Input	=	=	14.1 40.8 '== 28.7	=	=	14.0 21.9 18.7	_	
100	CGAC-D10	EER Capacity (Tons) KW Input	12.6 52.1 43.6	=	= -	14.4 41.2 28.3	=		14.3 22.0	= = =
110	CGAC-D11	EER. (Tons) KW Input	= -	13.2 54.3 43.6	<u> </u>		14.9 === 42.4 28.1		14.3 — —	14.7 5 22.4 =
120	CGAC-D12	EER Capacity (Tons) KW Input	12.7 62.5 52.9	=		14.3 - 48.6 34.9			13.2 25.3 18.8	14.1 ==

Table 30-3 — Integrated Part Load Values

Tons	Model No.	IPLV
10	CGA 120	11.3
15	CGA 180	11.0
20	CGAD-C20	12.7
25	CGAD-C25	12.4
30 🗆	CGAD-C30	128 🗻
35	CGAD-C40	133
40	CGAD-C50	12.7
60	CGAD-C60	13.3
70	CGAC-C70	11.7
80 -	CGAC-C80 =	11.8 🕾
90	CGAC-C90	12.5*
100	CGAC-D10	12.4
110	CGAC-D11	12.6* 🕾
120 ~	CGAC-D12	12.3 -

Notes

Witten retent in accompany with ANSYACTINA CAPE.

2. Values rated in accordance with ANSWASHRAEJES
Standard 90 1P

*50 ton component

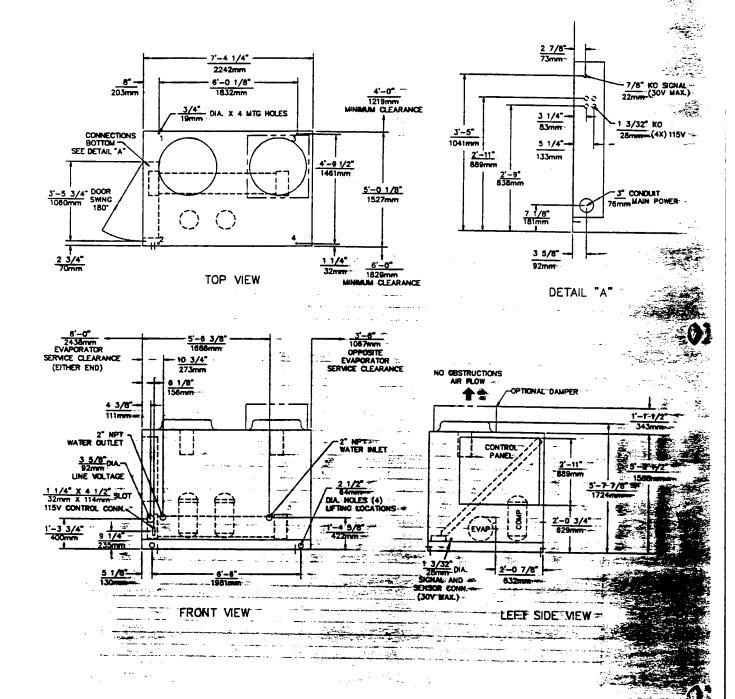
35 of 41 Eco 8-8

Dimensional Data

20 Ton



Figure 44-1 — CGAD-C20 Unit Dimensions

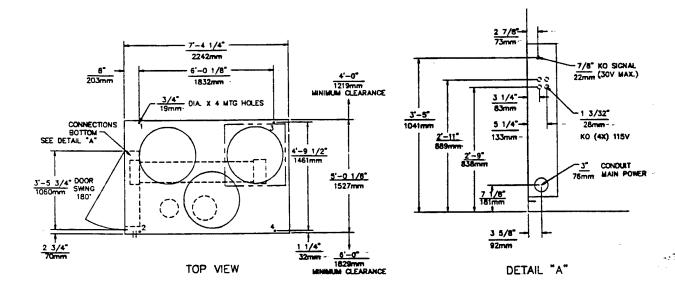


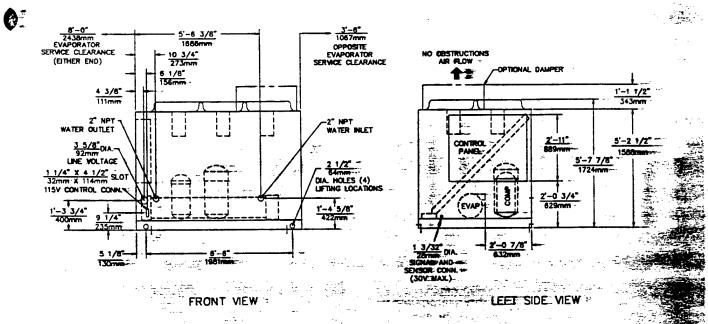
Dimensional Data

25 Ton

36 0=41 ECO B-8

Figure 45-1 — CGAD-C25 Unit Dimensions



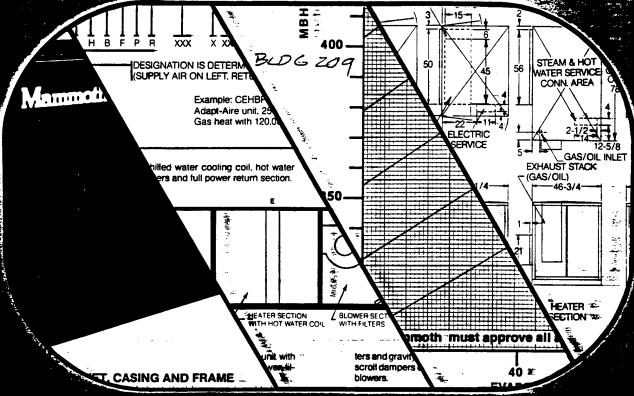


سالم يجانب أن المستحدث

Mammoth



10-60 TON



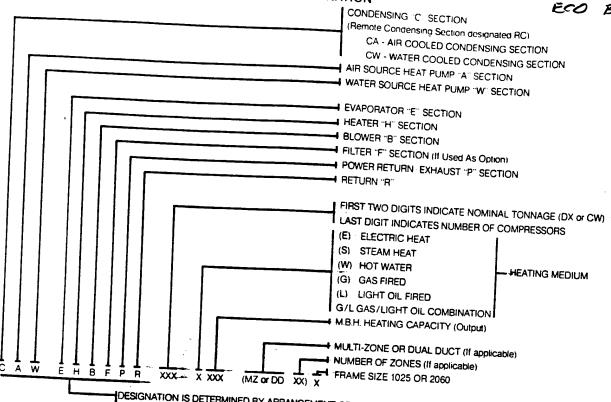
• SINGLE ZONE • MULTI-ZONE • VAV

HEATING & VENTILATING OSUPERMARKET UNITS C

● 100% MAKEUP AIR ● HEATING & COOLING ●

■WATER & AIR SOURCE HEAT PUMPS
■ DUAL DUCT

UNIT DESIGNATION

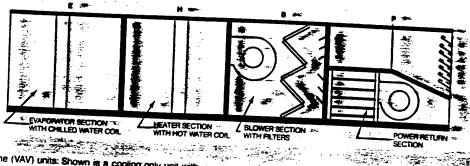


DESIGNATION IS DETERMINED BY ARRANGEMENT OF SECTIONS FROM LEFT TO RIGHT (SUPPLY AIR ON LEFT, RETURN AIR ON RIGHT)

CEHB-18/W258

Example: CEHBP 251 G 120 1025 Adapt-Aire unit, 25 ton capacity, one compressor, single zone. Gas heat with 120,000 BTU heat output and power return.

1. Typical single zone unit with chilled water cooling coil, hot water heating coil, supply air blower, filters and full power return section.



II. Variable air volume (VAV) units: Shown is a cooling only unit withcondenser, direct expansion evaporator coil, supply air blower, fil-

ters and gravity return air compartment. VAV units use either outlet or scroll dampers on TFC blowers or inlet vanes on single airfoil (SAD)



VIR COOLED CONDENSER

سے اور نے اور سامطیان ہارات

EVAPORATOR SECTION - WITH DIRECT

BLOWER SECTION WITH FILTERS

OUTSIDE AIR COMPARTMENT

· 阿里里斯斯斯 (1) 斯斯斯斯斯

Table 1	FRAME AA-1025—NOMINAL	CAPACITY AND MECHANICAL DATA
Table I	PRAME AA-1025—NOMINAL	CAPACITY AND MECHANICAL DATA

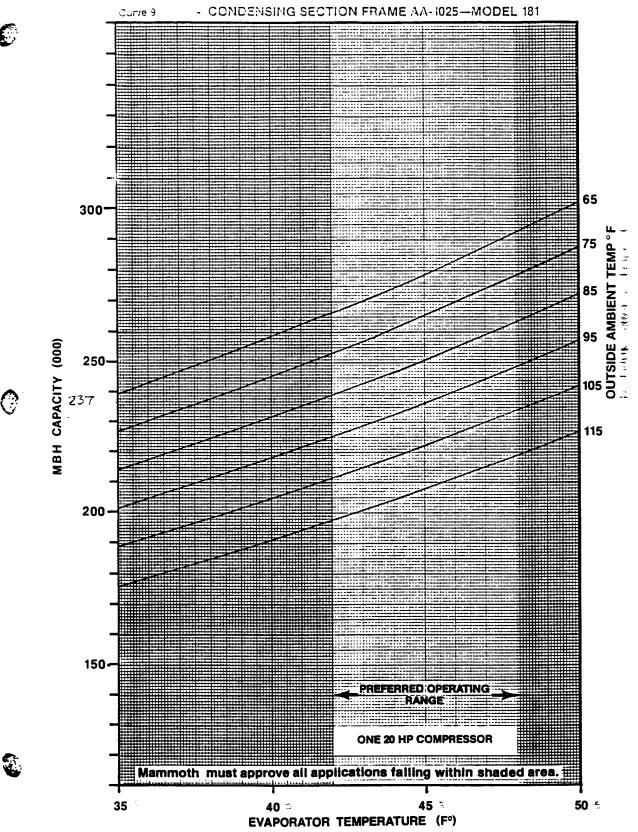
_									
_	MODEL NUMBER	111	112	151	162	181	201 -	202	251
	Nominal CFM Sz	4 500	4 500	6.100	6 300	7 200	8 000	8 000	10 500
	Nominal CFM Mz	4.500	4 500	6.100	6 300	7 200	8000	8,000	8 000
	Nom. Tons Sz/Mz	116/116	113/113	153/153	158 158	20 3 / 20 3	232:232	230/230	279 27
	Compressor	(1) 10	(2) 5	(1) 15	(2) 7-1 2	1		 	
	No /HP	(.,,.0	1 12/3	(1)13	12)7-12	(1) 20	(1) 25	(2) 10	(1:30
	Compressor Type				Sara	ermetic	L		
	Compressor KW Input*	 	1	T	Jerran	ermenc	г		
	95°F Ambient	1		ł			Ì		
	80°F/67°F	139	152	18.8	20.4	21.4	27.2	277	
	Capacity Reduction (Optional)		1 .02		sear Unloading			2//	31 4
	Steps of Unloading	100-67-0	T 400 50 0	,	,			, 	
	(Optional)	100-67-0	100-50-0	100-67-0	100-50-0	100-50-0	100-50-0	100-67-50-	100-67-33
	Condenser Coil Area Sq. Ft	142	102	20.2	1 202	20.0		33.0	
	Condenser Coil Rows	+	18.3	283	283	283	33.3	33.3	33.3
		3	2	2	2	3	3	3	3
	Condenser Fens No./Size—Inches	(1) 36	(1) 36	(1) 36	(1) 36	(1) 36	(1) 36	(1) 36	(1:42
	Condenser Fan HP	2	2	2	2	2	3	3	3
	Condenser C F M	8.500	11,000	13.700	13.700	12.800	14.900	14 900	17 000
_	Water Cooled	1	Avail	able-Refer to	Mammoth Su	ppiemental W	ater Cooled C	ataloo	
	Direct Expansion Coil		1					-	
	Face Area—Sq. Ft. Sz./Mz.	10.0/10.0	100/100	13.3/13.3	133/133	133/133	13.3/13.3	133/133	175 133
į	Standard Rows & Fins Sz /Mz	3E/3E	3E/3E	3E/3E	3E/3E	4E/4E	4F/4F	4F/4F	4E 6E
¥	Nominal Capacity MBH Sz./Mz.								02
Ě	@ 80°F/67°F 95°F Ambient	139/139	135/135	184/184	190/190	243/243	278/278	276/276	335 325
ŭ	Optional Rows	1	·		3.4.5 & 6 R				
_	Optional Fins	 							
	Chilled Water Coil	 			C.E & P	Available			
į	Face Area —Sq. Ft. Sz /Mz.	98/98	00/00						_
-			98/9.8	13.1/13.1	131/131	131/131	13.1/13.1	131/131	171 131
	MBH Natural Gas Heat Output Range			00 Multi Zona					
1	MBH Oil Heat Output Range			100 Multi Zone					
	MBH Propane Heat Output Range	120-500 Sing	le Zone. 235-4	100 Multi Zone	<u> </u>				
	MBH Electric Output Range At 460 Volts	114-950 Sing	le Zone. 114-9	50 Multi Zone)				
	M8H Range for Hot Water Coil Based on 200° Water △T 20° and 60°F/Air	70-800 Single	Zone, 125-54	0 Multi Zone	_				
-1	Hot Water Coil Size—Sq. Ft.	130 Single Zo				···			
-	Optional Rows				1, 2				
	Optional Fins								
	MBH Range for Sleam Coil Based on				C. E	a.r			
-	2# Steam and 60°F. Air	230-790 Singl	n 7ann 186 6	22 Mari 7000					
ı	Steem Coil Size—Sq. Ft.								
ł		13.0 Single Zo	ne. 8.4 Multi A	one					
ı	Optional Rows				1.8				
4	Optional Fins				C	E			
Ĺ	Nominal CFM	4.500	4.500	6.100	6.300 -	7.200	8.000	8.000	10.500
y.	Blower Number & Size	(2) 12x12	(2) 12x12	(2) 12x12	(2) 12x12	(2) 15x11	(2) 15×11	(2) 15×11	(2) 15x11
•[Norminal Motor Size**	1-1/2	1-1/2	3	3	5	5	5	7-1-2
1	Maximum C.F.M.***	6.250	6.250	8,310	8.310	8.310	8,310	8.310	11,000
-	Nominal C.F.M.	4.500	4,500	6,100	6,300 -	7.200	8.000	8.000	
	Blower Number & Sige	(2) 12×12	(2) 12×12	(2) 12×12	(2) 12×12				8.000
31	Nominal Motor Size **			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		(2) 15×11	(2) 15×11	(2) 15x11	(2) 15×11
	Maximum C.F.M.***	1-1/2	1-1/2	3	3	5	5	5	5
		6.250	6.250 ->	8.310	8.310	8.310	8.310	8.310	8.310
-					See FILTE	R DATA			
1	Filters								
1	Filters: Isolation (Optional)				Sprii	iĝs			
1	······································					rgs 0 '∞			
	Isolation (Optional)				1-1	0 🛎			
	Isolation (Optional) HP Range				1-1 (2) 15	0 ≔ xt1			
	Isotation (Optional) HP Range Blower No./Size C.F.M. Range				1-1 (2) 15 4,000-1	0 == x11 0.000			
	Isotation (Optional) HP Renge Blower No./Size CF.M. Renge Maximum E.S.P.				1-1 (2) 15 4,000-1	0 === xf1 0.000			
The second secon	Isotation (Optional) HP Range Blower No./Size C.F.M. Range Maximum E.S.P. HP Range				1-1 (2) 15 4,000-1 1,2 1/2—1	0 == xt1: 0.000 !			
	Isotation (Optional) HP Range Blower No./Size *** C.F.M. Range Maximum E.S.P. HP Range Exhaust Dempere				1-1 (2) 15 4,000-1	0 == xt1: 0.000 !			
	Isotation (Optional) HP Range Blower No./Size C.F.M. Range Maximum E.S.P. HP Range				1-1 (2) 15 4,000-1 1,2 1/2—1	0 155 mt1 0,000 1-1/2			

^{***}Based on a maximum evaporator face velocity of 625 FPM.

[&]quot;Blower horsepower based on CEHB unit with nominal evaporator EX coil, elected heat, 2" throwevery filters and 0.50" ESS

[&]quot;KW based on total system operating point at C.F.M. and total capacity listed in this table- and at the conditions stated, ~

Actual condensor ton horosperies less than the indicated for mater horosperies.



For VAV MZ or 100% outside air applications select high evap, temp, at design conditions.

Table 29

FRAME 1025—CONDENSER ELECTRIC DATA

. 44.0 -0							•	
*****				MODEL				
	111	112	151	162	181	201	202	251
ELECTRICAL				1		<u> </u>		1
Compressors FLA #1	411	20 4	603	31 7	709	879	411	104
#2	l	20 4	l	31 7		<u> </u>	411	l
208v LRA #1	208	141	284	145	308	158	208	170
2 2	l	141	<u> </u>	145		L	208	
Condenser Fans FLA (ea)	58	58	7.5	7.5	7.5	106	106	106
LRA (ea)	33 2	332	431	431	431	59 7	59 7	59 7
Total FLA	46 9	46.6	678	709	78.4	98.5	928	1146
Compressors FLA #1	372	185	54 5	28 7	64 1	795	37.2	94
#2	ŀ	185	1	28 7			37.2	
230v LRA #1	208	141	284	145	308	428	208	470
#2	j	141	ļ	145	i .	ĺ	208	
Condenser Fans FLA (ea.)	52	52	68	68	68	96	96	96
LRA (ea.)	30	30	39	39	39	54	54	54
Total FLA	12.1	422	613	642	70 9	891	840	1036
Compressors FLA #1	185	92	25	143	32 1	39 7	185	47
#2	1	92	1	143	}	ļ	185	
460v LRA #1	104	62 5	144	725	154	214	104	235
#2	ļ	62 5	1	72.5	ł		104	.1
Condenser Fans FLA (ea.)	26	2.6	34	34	34	7.8	48	48
ĘRA rea r	. 15	15	198	198	198	27	27	27
Total FLA	21.1	210	28 4	32 0	35 5	44.5	418	518
Compressors FLA #1	147	7.4	20	115	256	318	147	376
±2		74		115	1		14.7	<u> </u>
575v LRA #1	38.2	53.4	127	58	135	160	88.2	200
#2		534	1	58		<u> </u>	88 2	
Condenser Fans FLA (ea)	2.1	21	2.7	2.7	27	39	39	39
ŁRA (ea)	12	12	156	156	156	24	24	24
Total FLA	168	169	22.7	25.7	283	35 7	33.3	415

Table 30

FRAME 2060—CONDENSER ELECTRIC DATA

					A	ODEL					
T	221	222	261	262	301	302	351	352	452	502	802
ELECTRICAL											
Compressors FLA #1	879	41 1	104	411	133.3	60.3	150 4	709	879	104	133.3
#2		41.1	1	603		603	ļ	70 9	879	104	133.3
208v LRA#1	428	208	470	208	565	284	625	308	428	470	565
=2		208	1	284	J	284	1	308	428	470	565
Condenser Fans FLA (ea.)	58	58	58	58	7.5	58	75	7.5	106	106	168
LRA (ea)	33.2	33.2	33.2	332	431	332	431	431	59.7	59.7	99.5
Toral FLA	99 5	938	1156	1130	1483	1322	165 4	1568	1970	2292	300 2
Compressors FLA #1	79.5	37.2	94	37.2	120 5	545	136	64 1	795	94	1205
= 2		372	1	54.5		54.5	1	64 1	795	94	1205
230v LAA =1	128	208	470	208	565	284	594	308	128	470	565
		208		284		284		308	428	470	_ 565
Condenser Fans FLA (ea.)	52	52	52	52	6.8	52	68	68	96	96	152
LRA (ea)	30	30	30	30	39	30	39	39	54	54	90
Total FLA	89 9	848	1044	102.1	1341	1194	1496	1418	1782	2072	2714
Compressors FLA #1	39 7	185	47	18.5	60.3	25	68	32 1	397	47	603
= 2		185	i	25	1	25	1	32.1	39 7	47	603
460v LRA #1	214	104	235	104	283	144	297	154	214	235	283
#2		104		144		144	1	154	214	235	283
Condenser Fans FLA (ea.)	26	26	26	26	3.4	26	3.4	3.4	48	48	76
LRA (ea.)	15	15	15	15	198	15	198	198	27	27	45
Total FLA	149	42.2	52.2	487	671	55.2	748	710	890	1036	1358
Compressors FLA #1	31.8	14.7	376	147	48.2	20	54.4	25.6	318	376	482
#2		147	ŀ	20	1	20	1	25.6	31.8	376	482
575v LRA#1	160	88.2	200	88.2	230	127	225	135	160	200	230
#2		882	1	127	1	127	.1	135	160	200	230
Condenser Fans FLA rea	21	21	21	2.1	2.7	2.1	2.7	27	39	3.9	61
LRA (ea)	12	12	12	12	15.6	12	15.6	156	24	24	36
Total FLA	36 0	336	418	38.9	53.6	442	59.8	56.6	71.4	830	1086

Table 31

BLOWER MOTOR ELECTRIC DATA

BLOWER MOTOR	8	HORSE POWER														
ELECTRICAL		3/4	1	1-1/2	2	3	5	7-1/2	10	15	20	25				
208v	FLA LAA	31 186	40 232	5 8 33 2	75 431	10.6 59.7	16.8 99.5	24.3 146.0	31 0 179 1	46.4 265.4	59.7 345.0	75.2 424.6				
230v	FLA LRA	28 168	36 21	52	6.8 39	9.6 54	15.2 90	22 132	28 162	42 240	54 312	68 384				
460√	FLA LRA	1 4 8 4	1 8 10 8	26 15	34 198	4.8 27	7 6 45	11 66	14 84	21 120	27 156	34 192				
575v	FLA LRA	1 1 6 6	14	21	27 156	3.9 24	6 1 36	9 54	11 66	17 96	22 126	27 156				

NOTE: FULL LOAD AMPERES (FLA) AND LOCKED ROTOR AMPERES (LRA) VALUES ARE PER THE NATIONAL ELECTRIC CODE. ACTUAL PRODUCTION UNITS MAY DIFFER SLIGHTLY FROM THE ABOVE DUE TO MOTOR MANUFACTURER'S NAMEPLATE DATA.

Keller & Gannon

COMPUTED BY	ECO # B-9	PROJECT FHL EEAP
CHECKED BY	70. 100 111.000 115.00	16-403-10
DATE FEBRUARY 1993	PECOVER WASIE-HEAD	SHEET NO. / OFSHEETS
REV19		STEET NO STEETS
DESCRIPTION OF	WORK	
THE FORMS	OF WASTE-HEAT RECOVER	Y WERE EVALUATED
FOR THIS OP		
TUB FIRST	OPPORTUNITY CONSIDERED !	WAS HEAT RELOVEDY
FROM FUE		
FIZAN FUE	D OPPORTUNITY CONSIDERE	WAS HEAT BETOVERY
FROM AIR CO	hditioning Equipment.	
1) FIVE GA	S HEAT RECOVERY	
	asses from fired equipm	
	LE HEAT! HEAT EXCHANGE	
	N FLUES TO PREHEAT FEE	
	WATER MAKE-UP HEAT	
UPTOTHEF	ONT WHERE THE FLUE G	s temperature
REACHES IT	S DEWPOINT.	
	Para Service EVALVI	JE N
• • • • • • • • • • • • • • • • • • •	F RETROFITS WERE EVALUA	BTU/HR)
	ERS LARGER THAN	
	ated for Retrofiting W	
COMMERCIAL	Y AVAILABLE ECONOMIZER	5
GWAII EO BAI	LERS WERE NOT CONSIDER	SD FEASIBLE
	TROPIT DECAUSE OF UNA	
	LF' ECONOMIZERS AND T	
FIELD FORE	CATED UNITS	
2.) A/C UNIT	HEAT RECOVERY	
AIR CONDITIO	WING SYSTEMS FEATURING	A SRIT
EVAPORATOR	AND CONDENSER FUNCT	ions were
CONSIDERED	FOR THE INSTALLATION	F A DOMESTIC
•	MAKE-UP PREHEATER	

Keller & Gannon

COMPUTATION SHEET

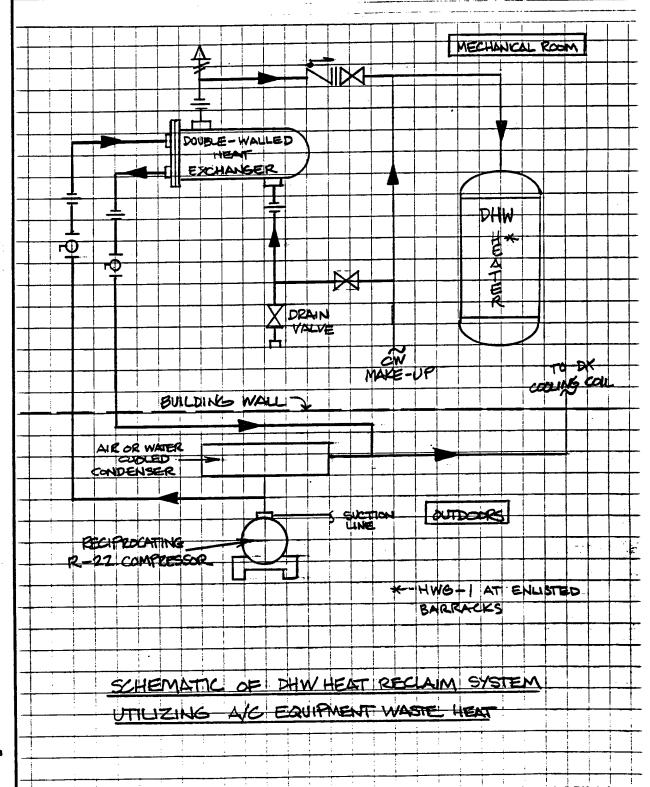
Engineers-Architects

	- A-	EC	A /A SUCTE		16-403-10	>
FEBRUAR	RY 19 93		A/C SYSTEL EAT FOR D		T NOOF	91
	19	MASIE HE	SAT FOR D	HAA SHEE		
Descrit	phon of	WORK -	CONTINUE	>		- -
		D BY AIR				:
POSSI	BLE TO	RECOVER	TO ASSIST	IN PREA	EATING T	4/2
COLD	WATER_	MAKE-UP	70 THE D	DMESTIC.	HOT WATE	叉
SYST	EM.					÷
						_ <u></u> -
THIS	OPPORTU	VITY IN VOLV	es the in	STALLATIO	N OF A	
REFR	IGERANT.	TO: DHWTH	ieat excha	nger 1	PARALLE	<u>ا</u> .
HTIW	THE EX	STING A/C	UNIT'S A	e or w	ATER	
COOLE	ED COND	enser				<u> </u>
						<u>-</u>
PLUMF	BING COD	es require	THAT THE	HEAT	exchange	2:
BE	DOUBLE-V	MALLED TO	PREVENT	CONTAMI	NATION OF	E
THE	DOMISTIC	WATER SU	PLY.			
	* .					
CONT	rols for	2 1HIS SYS	TEM ARE	MINIMAL	SINCE	
		eant will	1	:		56 K
THE	REFRIGE		SEEK	WE HEA	t exchang	;5K
THE MOST	REFRIGE	PANT WILL TO CONDEN	SEEK) SE THE !	ue hea Leerice	t exchang Rant	
THE MOST	REFRIGE ABLE CONDENS	to conden ser most	SEEK) SE THE ! ABLE TO	ue hea Ceruge Cool the	t exchang Rant E perigera	76
THE MOST	REFRIGE ABLE CONDENS HAVE A	CONDEN TO CONDEN SER MOST	SEEK) SE THE ! AGLE TO ZESSURE AS	ue hea Berige Cool the More	t exchang Rant E perigera Gas conde	76m
THE MOST	REFRIGE ABLE CONDENS HAVE A	THUS AUTOI	SEEK) SE THE / ABLE TO ZESSURE AS MATICALLY	ue hea Ceruge Cool The More Drawing	t exchang Rant E perigera Gas conde	767 7864
THE MOST	REFRIGE ABLE CONDENS HAVE A	CONDEN TO CONDEN SER MOST	SEEK) SE THE / ABLE TO ZESSURE AS MATICALLY	ue hea Ceruge Cool The More Drawing	t exchang Rant E perigera Gas conde • More •	767 126
THE MOST THE WILL TO 1 REF	REFRIGE ABLE CONDENS HAVE A LIGUID, RIGERAN	THUS AUTOI	SEEK SE THE I AGLE TO ZESURE AS MATICALLY THAT COND E FOR A	ue hea Ceruge Cool The More Drawing	t exchang Rant E perigera Gas conde	76m
THE MOST THE WILL TO I	REFRIGE ABLE CONDENS HAVE A LIGUID, RIGERAN THE FOLLO RECLAIN	CONDENSER MOST LOWER PI	SEER ISE THE ISE TO BE FOR A.	ue hea Ceruge Cool The More Drawing	e perigera Gas conde	767 126
THE MOST THE WILL TO I	REFRIGE ABLE CONDENS HAVE A LIGUID, RIGERAN THE FOLLO RECLAIN	CONDENDER PORTON COMER PORTON THUS AUTON TO SOUTH PAGE TO	SEER ISE THE ISE TO BE FOR A.	ue hea Ceruge Cool The More Drawing	T EXCHANG RANT E REFIGERA GAS CONDE MORR H MORR H	76m
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FORM 101-1/8

Keller & Gannon

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CHECKED BY	RECOVER A/C SYSTEMS	
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Keller & Gannon

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Keller & Gannon

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CONSTRUCTION COST ESTIMATE				Prepared February 1993		Sheet Of			
	Project No.		Fatimate						
Project EEAP Limited Energy Study	Project No.	Basis for Estimate Code A (no design competed)							
Fort Hunter-Liggett, California Engineer-Architect]	(III) GOOGII COII	peuu)		
Keller & Gannon									
Drawing No. Estimator				Checked By					
ECO-B9 A/C Equip. Heat Reclaim	1 0	entity	·	Labor		Asterial	,		
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total := Cost :		
Double Wells diller Sudan	1	-		6000	ļ	#E 000	#5 000		
Double-Walled Heat Exchanger	1 1	EA	•	\$200	-	\$5,000	\$5,200		
1 1/8" cu tubing/Insulation	90	LF	\$3	\$250	\$3	\$248	\$498		
3/4" cu tubing/Insulation	90	LF	\$2	\$180	\$2	\$180	\$360		
2" Black Steel Pipe	40	LF	\$4	\$140	\$6	\$244	\$384		
Cu Fittings	1	LS	-	\$50	-	\$25	\$75		
Steel Fittings	1	LS	-	\$500	-	\$250	\$750		
Hangers/Supports	1	LS	•	\$200	-	\$200	\$400		
Subtotal							\$7,667		
Sales Tax @ 8%			<i>.</i>	<i>f</i> :	N -		\$613		
Subtotal							\$8,280		
Contractor OH & Profit @ 30%							\$2,484		
Subtotal							\$10,764		
3ond @ 1%							\$108		
Subtotal							\$10,871		
stimating Contingency @ 10%							\$1,087		
Total Probable Construction Cost							\$11,959		

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Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

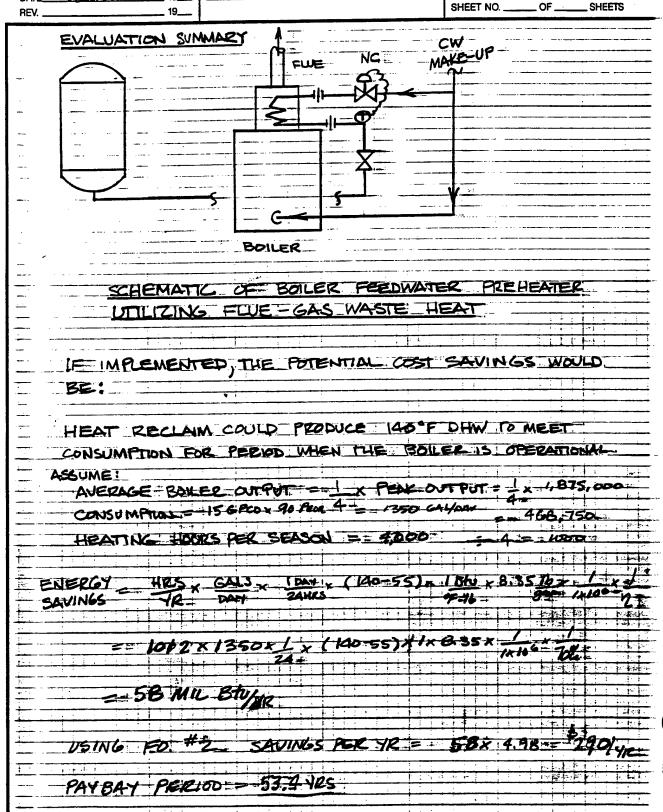
Project No. 16-403-10 Region No. 4 Location: Fort Hunter Liggett, California . Fiscal Year FY96 ECO-B9 A/C Equip. Heat Reclaim Project Title: Building 205 Discrete Portion Name: : Economic Life: > 15 TEARS Preparer: KELLER & GAI Analysis Date: March 1993 1. investment Costs \$12,000 A. Construction Costs \$660 B. SIOH \$0 # C. Design Cost ... \$12,660 D. Total Cost (1A+1B+1C) \$0 2 E. Salvage Value of Existing Equipment \$0 ÷ F. Public Utility Company Rebate \$12,660 G. Total Investment (1D-1E-1F) 2. Energy Savings (+)/Cost(-): Date of NISTIR 85-3273-X Used for Discount Factors Discount: Discounted = Saving Energy Cost Factor(4) MBTU/YR(2) Savings(5) Savings(3) Source -\$/MTBU/(1) \$18.23 11.70 \$0# A. Elec: 0 3 \$149 -= 13.78 \$2,059 B. Dist. \$4.98 30 -14.16 \$0.2E C. Propane \$7.87 0 > SOF NA-SOM: NA = D. Other -NA-\$0 \$ SOT 11.70 E. Demand Savings ... \$2,059 F. Total 30.JE 3. Non Energy Savings (+) or Cost (-): A. Annual Recurring (±/-) --\$0: (1) Discount Factor (Table A) (2) Discounted Savings/Cost (3A x 3A1) B. Non Recurring Savings (+) or Cost (-) Factor(3) 🎏 ings(+)Cost(-)(4) = 0.58 15 🕿 SOME × 0.56 \$0.4 15 🛎 \$0.E 0.563 \$0 **#** 15 % \$0.-d. Total = C Total Non Energy Discounted Savings (3A2+3Bd4)

4. Simple Payback 1G/(2F3+3A+(3Bd1/Economic Life)):

5. Total Net Discounted Savings (2F5+3C)::::
6. Savings to Investment Ratio (SIR) 5/19: ...
7. Adjusted Internal Rate of Return (AIRR): %

Keller & Gannon **COMPUTATION SHEET**

COMPUTED BY US CHECKED BY	ECO # B9	PROJECT FHL EEAP
DATE PERCUARY 1993 REV19		SHEET NO OF SHEETS



CONSTRUCTION COST ES	TIMAT	Έ		Date Prepared February	1993	Sheet Of	
Project 2001				Project No.	Basis for	Estimate	
EEAP Limited Energy Study]		
Location					Code A	(no design comp	peted)
Fort Hunter-Liggett, California							
Engineer-Architect							
Keller & Gannon Drawing No.		Estimato	×		Checked	Ву	
ECO-B9 Flue gas Heat Reclaim					İ		
	No.	antity Unit	Per	Labor	Per	Azteriai	Total
Line item	Units	Meas.	Unit	Total	Unit	Total	Cost
Boiler Economizer	+	LS	-	\$2,500	-	\$6,000	\$8,500
Donot Economizat	 						
2" Steel Pipe	30	LF	\$8	\$250	\$4	\$120	\$370
2 00011 190	1 -		·				
Valve and Fittings	1	LS		\$500	-	\$500	\$1,000
Taro and Tanigo							
	1			_			
	1						
Subtotal							\$9,870
Sales Tax @ 8%						·	÷ \$790
Subtotal							\$10,660
Contractor OH & Profit @ 30%							\$3,198
Subtotal							\$13,857
Bond @ 1%							\$139
Subtotal							\$13,996
Estimating Contingency @ 10%							\$1,400
Total Probable Construction Cost							\$15,396
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Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

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FORM 101-1/8

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

Location: Project Title:		gett, California juip. Heat Reclaim	Region No. 4		Project No. 'Fiscal Year	16-403-10 FY 96 æ
Discrete Por		Building 205				
Analysis Dat	e: March 1993		Economic Life:	15 YEARS	Preparer: KE	LLER & (
1. investmer	nt Costs					
A. Construct	ion Costs		\$15,400			
B. SIOH			\$847	*.=		
C. Design C	ost -		\$0 -∞	.		
	t (1A+1B+1C)		\$16,247			
E. Salvage V	alue of Existing Ed	quipment ·		\$0 ₹		
	lity Comp any Reb a			\$0 🛥		_
G. Total Inve	stment (1D-1E-1F)				\$16,247	
0 Energy Sc	wings (+\/Cost(-\)					
Date of NIST	ivings (+)/Cost(-): TR 85-3273-X Used	for Discount Facto	18			
F	0	Sautan	Annual \$	Discount	Discounted	
Energy	Cost	Saving	Savings(3)	Factor(4)	Savings(5)	
Source	\$/MTBU/(1)	MBTU/YR(2)	Samifie(S)	racco (4)	Odda (Ga(O)	
A. Elec	\$18,23.	0 🛎	\$0.2	11.70	\$0 =	
B. Dist	\$4.98	58 #	\$289	13.78	\$3,980	~ ;
C. Propane	\$7.87	0 -	\$0.2	14.16	\$0.≇	
D. Other	NA-	0 *	\$02	NA-	NA.≠	
E. Demand S			\$0=	11.70	\$0 🏗	•
F. Total		58.3	\$289.		\$3,980	
3. Non Energ	y Savings (+) or (Cost (-):		-		
A. Annual Re	curring (+/-)		\$0.≇			1,2
	Factor (Table A)			11.12		
	ed Savings/Cost (3				\$0.2	7 mg
						1 1/2
B. Non Recu	ming Savings (+)	or Cost (-)		•		
Item. •	Savings(+)	Year of ::	Discount ==	Doecounted Sav-	***	74.46
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	and the same of th				ere maj ka	-
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b. ±2	\$0.5	15 🐲	0.56	\$0.8	· Salar Salar	-
C. ±:	\$0 €	15 ★	0.56	\$0.	-	100
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C Total Non	Energy Discounted	i Savings (3A2+3Bd	14)	\$0≅	* <u>*</u> * *	
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	Investment Ratio			-13%		
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ECO BIO Sheet Rof8

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Š	Installation Name		iii	Propane	Fuel Oil	Flactric	Propere		200	Tono.	Investment	Barrhage	ç
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P 47	Family Housing CG & WO	L		Ī						•	•	•	•
P 51A	Family Housing NCO & En	ļ				•	•	•		•	•	•	٠
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3	Family Housing CG & WO		•	٠	•	•	•	•	·	•	•	٠	·
7. 22.	Family Housing CG & WO		•	٠	•	١	•	•	•	•	•	ŀ	ľ
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P 60	Family Housing CG & WO	L	•		•	·		ľ]			
S 79	Post Office, Main	L	·	•	•		1		•				
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P 81	Theater with Dressing Rm's		•	•			•						77
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	Hacienda, East Rooms												
	Haclenda, West Rooms												
P 116	Exchange Service Station	_	-	ľ	•	1							
	(Non-shop areas)								1			•	•
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	Fire Station - Garage	~						·					
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ECO BIO Sheet 3 of 8

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<u>ė</u>	Installation Name	9 19 19 19	Electric KWH/7r	Properse MII BTU/Y	Fuel Oil Mil BTU?	Electric \$77r	Propane \$77r	Fuel Oil	LCC \$	Constr	Investment	Payback Years	SIR
121	Bowling Center			=	•	•	\$8.48		\$120	\$568	\$633	74.66	0.19
T 124	Family Housing LC & MJ	1	1	1	1	1	-						. 1
T 127	Officers Quarters Military		·	4.4			\$34.81	ľ	\$493	\$541	\$603	17.33	080
P 128	Officers Quarters Military		•	13.1	•	•	\$102.99	[\$1.458	\$568	\$633	8 15	230
131	Family Housing CG & WO		•	6.0			\$7.04		\$100	\$531	\$592	8 10	0.17
4	Gymnasium	L	·	•	•	•	•	•		•	•		
S 146	FE Facility		•	•	•		•			•	•	Ľ	
T 149	Family Housing NCO & Enl		•	2.5	•	•	\$19.47	•	\$276	\$531	\$592	30.42	0.47
T 156	FE Facility - Shop FE Facility - Office		•	•	•	•	•	•	1	•	•	'	•
T 158	Vehicle Storage		·		•		•	•	•	•	•		
<u>5</u>	Admin General Purpose				•	•	•	•	•		•		
8	Elec Maint. Shop	_		•	•	•			•		•	ľ	
183	Officers Quarters Military		•	•	•	•		•	•	•	•		ľ
T 164	Admin General Purpose		•	•	•	•	•	•	ŀ	٠	•	Ī.	
165	Admin General Purpose		•	·	•	'	•	•	•		'		
166	Officers Quarters Military		٠	•	·	•	•	•	•		٠	<u> </u>	
167	Officers Quarters Military		•	•	•	•	•		•	•	•	'	l'
S 168	General Purp Warehouse		•	•	•	•	•	•					
T 172	Cold Storage Warehouse		٠	•	•	•	•	•	•	•	•		<u>'</u>
P 177	Technical Library		•	•	•	•	•	•	•	•		Ŀ	·
P 178	Child Development Cntr		•	•	•	•	•	•	•	•	'	•	
S 182	Commissary		•	•	•	•	_		٠	•	•		_
S 186	Sup Svc Admin Bldg		•	•	•	-	•	•	•	•			Ľ
8	Post Chapel		•	•	•	٠	•	٠			'		ľ
S 197	Admin Bidg R&D - Office	-	•	5.7	•	•	\$44.87	•	\$635	\$541	\$603	13.44	1.05
8	General Inst Bida	+	•	-	•		\$8.33	•	£118	\$E41	6 603	70 07	5
200	Admin General Pumose	L			0 00			\$440 OF	4	5	200	1	0.20
P 205A	Company HQ Building			•	20.5			4140.63	200.	78C#	2 6 8	 3	9 8 Ni
P 206	Enlisted Pers Dining Fac	-	•	•	81.8	•	•	\$407.38	\$5,614	\$1,164	\$1,298	3.19	4.33
Į		1						2 2	-				
P 207A	Company HQ Building#	-	•		χ. Σ. Ξ.	•	•	\$140.90	25 ~	\$585 +	8649	4.61	 2.99
P 208 P 208A	Eni Barracka w/c Company HQ Bi	T.		• •	28.0			\$139.49 \$ 18 : 19	\$1,922	\$582	\$649	4.65	2.96
v											-	-	
	F 19 19 19 19 19 19 19 19 19 19 19 19 19												

Fac	_	ECO	6	B10 Energy Savings:		Automatic Flue Dampers	Dampers						
Š	Installation Name	B10	Electric	Propane	_	Electric	Propane	Fuel Oil	\$ 001	Constr	Investment	Pavhack	ais
		힏	kWH/Yr	MII BTU/MIII BTU/	MII BTU?	\$/⊀	\$∕7r	\$∕₹	Saved	Cost			<u>.</u>
9 208 4	AAFES Snack Bar	1	•	2.0	•	•	\$15.97		\$226	\$541	\$603	37 78	0.37
P 210	Hith/Dritl Clinic w/ Beds	1	•	•	21.5			\$106.94	\$1.474	\$582	\$649	203	200
P 211	Outdoor Swimming Pool	-	٠	27.2	•		\$214.28		\$3.034	\$568	\$633	900	4 70
P 212	Gymnæsium	1	•	16.5	·	•	\$129.83		\$1.838	\$541	\$603	4 85	205
P 219	Physical Fitness Center	1		9.4	·		\$74.16		\$1.050	\$569	\$693	3 2	20.5
83 2	Enl Barracks w/o Dining	1	•	٠	28.1	•		\$139 R7	\$1.007	\$580	¢640		3 6
P 229A		j	-					200	170'12	7000	250	Š F)R:X
P 230	Eni Barracks w/o Dining	-	•	-	28.4		•	\$14135	\$1.048	\$580	¢640	7 50	8
P 230A		-			-			}	3	700		e e	3.6
\$ 235	Admin General Purpose			•			•	•		T			
\$ 236	Admin General Purpose		•	•	•	1							$\cdot \mathbb{I}$
\$ 237	Admin General Purpose					1					•	•	
8 238	Sig Photo Lab	-	•	10.8	ľ		605 47		. 98			'	
.:	Process) -	'			•	92	<u> </u>	7808	9 9 9 9	9. 20.
P 240	Admin General Purpose		·	•		•		•	•				
8 241	GM Facility at a limit of	-	٠	3.4	ŀ	•	\$28.54	•	\$37B	6544	6603	. 25	. 8
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\$ 243	Admin General Primose												
3244	Admin General Purpose	T	•			•		•			•	•	
\$ 246	Admin General Pumpse						•		•	•	•	•	•
8 247	Admin General Dimose			•	1					•	•	•	
0 000	Votice Main Office Po	ŀ						•	•	•	•	•	•
2000	Vol. 12 Maint Shop DS				18.5			\$92.11	\$1,269	\$585	\$649	7.05	1.96
000	Verice maint one Original	-			8.3		•	\$41.14	\$567	\$228	\$842	15.61	0.88
200	FE MAINT STOD ONG		•	1	8			\$100.11	\$1,379	\$582	\$649	6.48	2.13
3			•			•	•	•	1	•	•	•	
S 286	Admin General Purpose		ľ	ŀ				•					
P 287	Recreation Building +	-	•	3.0	•	ľ	\$23.74		\$338	\$541	tens .) F 44	. 65
S 288	General Purpose Warehouse	·	•	•	•	•	•				-	F.3.1	3
280 280	Electron Equip Facility and a		•	17.4	•	·	\$137.19	•	\$1,943	\$568	\$633	4.62	3.07
S 291	Cont Humid Warehouse	-	٠	9.4	•	•	\$74.03	ŀ	\$1,048	\$568	\$633	8.55	1.66
288	Eni Barracks w/o Dining	-		25.5	٠	•	\$200.71		\$2,842	\$568	\$633	3.16	4.49
ر ا			•	0.7	•	1	\$5.58	•	62\$	\$541	\$603	108.15	0.13
		- 34	د درد شون										
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ECO B10 Showt 5 of 8

		TEACHER.		3	A	21.10							
Z E		3		CINETRY SAN	DID EININGS ANIONAIIC FINE DAIMPERS	manc rine	Dampers						
ş	Installation Name	B 10	Electric	Propane	octric Propane Fuel Oil Electric Propane Fuel Oil	Electric	Propane	Fuel Oil	\$ 007	Constr	LCC \$ Constr Investment Payback SIR	Payback	SIR
		Ind	kWH/Yr	WII BTUM	HAY MI BTUM MII BTUM	\$Mr	£7.	₹	Saved	Cost		Years	
P 642	642 Detached Latrine/Shower		•	•	٠	•	•	•			•	•	•
\$ 2201	Control Tower - Range SPT		•		•	•	•	•	•	•			•
Totals			0	174.3	282.8	S.	\$1,372	\$1,408	\$0 \$1,372 \$1,408 \$38,830 \$13,059	\$13,059	14,560.8	5.24	2.67
_		Total	Totals are for bu	ildongs wil	for buildongs with SIR's > 1.0 ONLY	1.0 ONLY							
		-	149	4									

CONSTRUCTION COST ES	TIMAT	F		Pebruary	1993	Sheet 6	of B
Project				Project No.	Basis for	l	
EEAP Limited Energy Study				16-403-10			
Fort Hunter-Liggett, California					Code A	(no design comp	rea)
Engineer-Architect Keller & Gannon					1		
Drawing No.		Estimato	or		Checked	Ву	
ECO-B10 Install Automatic Flue Damp	ers on	RJB			BIH		
I to a Manual		antity	Lı Per	abor	Per	/aterial	7.1.1
Line Item	No. Units	Unit Meas.	Per Unit	Total	Unit	Total	Total Cost
OIL FIRED HEATERS							
4-inch Diameter Auto-Damper	1	Ea	32.00	\$32	\$156	\$156	\$188
Relay & Wiring	-	Job	-	\$120	-	\$60	\$180
Subtotal 4-inch Flue, Oil Fired							\$368
Sales Tax 8%							\$29
Contractor O.H. & P 30%							\$29
Sub Total							\$426
Bond 1%							\$4
Sub Total							\$431
Estimating Contingency 10%							\$43
Total Probable Construction Cost							\$474
6-inch Diameter Auto-Damper	1	Ea	34.90	\$35	\$161	\$161	\$196
Relay & Wiring	-	Job	-	\$120	-	\$60	\$180
Subtotal 6-inch Flue, Oil Fired							\$376
Sales Tax 8%			-				\$30
Contractor O.H. & P 30%							\$113
Sub Total							\$519
Bond 1%							\$5
Sub Total							\$524
Estimating Contingency 10%							\$52
Total Probable Construction Cost							\$576
							-
8-inch Diameter Auto-Damper	1	Ea	38.40	\$38	\$161	\$161	\$199
Relay & Wiring	-	Job	-	\$120	-	\$60	\$180
Subtotal 8-inch Flue, Oil Fired							\$379
Sales Tax 8%							\$30
Contractor O.H. & P 30%							\$114
Sub Total							\$524
Bond 1%			Ì				\$5
Sub Total							\$529
Estimating Contingency 10%							\$53
Total Probable Construction Cost							\$582

				Date Prepared		I Sheet (OF
CONSTRUCTION COST ES	TAMITE	E		February		7	ື 8
Project EEAP Limited Energy Study				Project No. 16-403-10	Basis for	Estimate . (no design compe	atari)
Fort Hunter-Liggett, California						(iio dosigii oonipe	,
Engineer-Architect Keller & Gannon							
Drawing No.		Estimato	У		Checked	Ву	· · · · · · · · · · · · · · · · · · ·
ECO-B10 Install Automatic Flue Dam	pers on	RJB			BIH		
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
GAS FIRED HEATERS							
4-inch Diameter Auto-Damper	1	Ea	32.00	\$32	\$134	\$134	\$16 6
Relay & Wiring	-	Job	-	\$120	-	\$60	\$180
Subtotal 4-inch Flue, Gas Fired							\$346
Sales Tax 8%							\$28
Contractor O.H. & P 30%							\$104
Sub Total							\$478
Bond 1%							\$ 5
Sub Total							\$483
Estimating Contingency 10%							\$48
Total Probable Construction Cost							\$531
, in the second							
6-inch Diameter Auto-Damper	1	Ea	34.90	\$35	\$138	\$138	\$173
Relay & Wiring	-	Job	•	\$120	-	\$60	\$180
Subtotal 6-inch Flue, Gas Fired							\$353
Sales Tax 8%							\$28
Contractor O.H. & P 30%							\$106
Sub Total							\$487
Bond 1%							\$ 5
Sub Total							\$492
Estimating Contingency 10%							\$49
Total Probable Construction Cost							\$541
8-inch Diameter Auto-Damper	1	Ea	38.40	\$38	\$152	\$152	\$190
Relay & Wiring	-	Job	-	\$120	-	\$60	\$180
Subtotal 8-inch Flue, Gas Fired							\$370
Sales Tax 8%							\$30
Contractor O.H. & P 30%							\$111
Sub Total							\$511
Bond 1%							\$ 5
Sub Total							\$516
Estimating Contingency 10%							\$52
Total Probable Construction Cost							\$568

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Life Cycle Cost Analysis Summary ECO B10 Energy Conservation Investment Program (ECIP) Sheet 8 of 8

Location: Project Title:	Fort Hunter Lig Automatic Flue tion Name: ECO#	Dampers on HVAC	Region No. 4 HW Boilers		Project No. 16		
	tion Name: ECO# te: March 1993	EB-10	Economic Life:	15 YEARS	Preparer: KELI	ED & CAN	NON
			Lookatilo Elia.	io illato	riepaier. KELI	LER & GAN	NON
1. Investmer							
A. Construct B. SIOH	ion Costs		\$13,059	•			
C. Design Co	200		\$718				
	t (1A+1B+1C)		\$784				
E. Salvage V	alue of Existing E	auinment	\$14,561	\$0 3.			
F. Public Util	ity Company Reb	ate		\$0 .	_		
G. Total Inve	stment (1D-1E-1F)			 \$14,561		
	•	•			414,001		
2. Energy Sa	vings (+)/Cost(-):						
Date of NIST	IR 85-3273-X Used	d for Discount Facto	rs				
Energy	Cost	Saving	Annual \$	Discount	Discounted		
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)		
A. Elec.	\$21.84	0.0	\$0.≇	11.70	60 m		
B. Dist	\$4.98	282.2	\$1,405	13.78	\$0 <i>≖</i> \$19,366		
C. Propane	\$7.87	174.3	- \$1,372	14.16	\$19,424		
D. Demand	\$108.60	0.0	kw \$0.3:	11.70	\$0.₹		
E. Other			•				
F. Total			\$2,777		\$38,790	-	
3. Non Energ	y Savings (+) or (Cost (-):					
A. Annual Red	ourring (+/-)		\$0:#□				
(1) Discount F	actor (Table A)		40.5	11.12			
	d Savings/Cost (3	A x 3A1)	•	11.12	- \$0 <i>≡</i>		
B. Non Recun	ring Savings (+) c	or Cost (-)				÷	
item -	Savings(+)	Year of	Diagona				
	Cost(-)(1)	Occur. (2)	Discount ~	Doscounted Sav-		2000 - 10	شبر
		Occur. (2)	Factor(3)	ings(+)Cost(-)(4)		" description of	ولايعاد
1. 45	* *		•*				
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3. =:					•		A
i. Total -			**	-	•	أيني	- :
C Total Non E	nergy Discounted	Savings (3A2+3Bd	4)	\$0≆		3.3	
		•	•	~ V <i>∞</i>			
Total Nac C	DECK 1G/(2F3+3A	+(3Bd1/Economic L	_ife)):		Years	23.5	
. Cavince to 4	scounted Savings nvestment Ratio ((2-5+3C);	÷	\$38,790 =		* # . :	uh≠
'. Adjusted int	nvesument Hatio () emai Rate of Retu	əm (AIRR):		2.66 :~			

Keller & Gannon

COMPUTED BY RUTS	FCO# B-11	PROJECT 16.403-10
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Keller & Gannon

Engineers-Architects

COMPUTED BY ZJB CHECKED BY BH DATE 197	ECO+B-11 ECOHOMIZER	PROJECT 16-403-10
REV1919	TRACE GOO ASSUMPTIONS	SHEET NO. 2 OF 16 SHEETS
BUILDING	TRESCRIPTION OF 1	TODEL
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24	THE EXTRICIOR OF ROOMS IS TRUITED TO	THE MECHANINGE ETO 17HD OUTSIDE O THE CENTRAL O TROUDE 1006
24	THE EXTRICIOR OF ROOMIS REHETRAT AVE IS TOUCHED TO MULTIZOHE WHIT T	THE MECHATHICAL ETS ATHO OCITSIDE STHE CENTRAL O PROVIDE 1006 SIDE, TIR LITERAL
24	THE EXTERIOR OF ROOMIS REHETRAT AVE IS TOUCHED TO MULTIZOHE WHIT T WHICHPITTOHERS DUT ALL ZONES REQUIT	THE MECHATHICAL ETS ATHO OCITSIDE STHE CENTRAL O PROVIDE 1006 SIDE, TIR LITERAL
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Keller & Gannon

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DATE 191 REV. 191	- TRICE GOD ASSUMPTIONS	SHEET NO. 3 OF 16 SHEETS
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Keller & Gannon

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+ 1993 MEANS COST FOR LORVERS !	rem ceras 6.3 Thil
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15 YE ESCALATION,	

ECO BIL Sheet 50 f 16

ECO: RETROFIT ECONOMIZERS ON EXISTING COOLING SYSTEMS

ENERGY SAVING CALCULATIONS FOR NON-TRACE 600 BUILDINGS

Cooling energy is saved by an economizer system by rejecting Return Air which is at a higher energy level (enthalpy) than the outside air. The outside air is conditioned and supplied to the space in place of the higher energy return air.

For the purposes of these calculations, dry bulb temperature is used to discriminate between outside air and return air. An economizer is assumed engaged whenever the outside air temperature is lower than that of the return air.

Most conditioned spaces are not authorized cooling when outside temperatures are below 78 Degrees F. (Fort Ord Regulation 11-2) However, systems are normally operated to provide space temperatures in the range of 72 to 75 Degrees F even though the minimum cooling temperature setpoint authorized is 78 Degrees F.

Since energy savings for an economizer occur when return air temperature exceeds outside air temperature, only buildings which require cooling during normally non-authorized periods are applicable to this ECO.

Assume return air temperature is 72 Degrees F. Assume supply air temperature is 55 Degrees F. Assume 1.5 CFM per floor SF air supply. Assume 25% OA is introduced into the space.

Eco Bil Sheet 6 of 16 =

66.5 64.2 63.5

69.7 68.0

70.8

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2 3 4 5 6 7 8 9 10 11 12 14 15 16 17 18 16 16 11 12 14 15 16 17 18 19 10 11 12 13 14 15 16 16 16 16 16 16 16 16 16 16 17 18 19 20 21 402 38.6 37.7 36.6 37.7 36.6 37.6 67.7 67.7 67.0 67.8 67.9	8	S	8		3	‡	49.8	51.7	409			8 8	8 8	3 6	4 2.7	39.3
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Annual Hourly Temperatures, Averages per Month:

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March	7	20	63.8	83.5	83.5	63.6	2	8.0	65.6	86.6	67.9	2.0	4.0	71.0	71.2	0.1	70.4	4.69	68.2	67.3	86.5	88
Had :	8 0	65.0	2 -	2	2	2	8	7.99	66.9	88.3	70.1	71.8	72.9	73.7	74.0	73.7	73.0	72.0	70.7	68.1	1.89	67.2
Meny	8	68.7	4.0	8 6	8	65.2	65.6	8 .	67.3	68.5	9.0	71.5	72.5	73.1	73.3	73.1	72.5	7.17	70.4	69.2	68.3	67.6
un :	86 85 85	0.0	97.9	67.3	67.5	4.79	67.9	89.8	20.5	1.27	73.8	75.4	76.6	4.7	7.77	4.77	7.97	75.6	74.3	73.0	71.7	5
Any	9 4	69 60 60	8 -	8	0.0	88 .	68.7	69.7	71.3	£.	74.9	76.6	47.9	78.7	79.0	78.7	78.0	76.8	75.4	74.1	72.9	71.9
August	60	28.7	8 -	8	98.0	8	98.6	80.5	71.1	72.7	74.3	75.8	76.9	7.77	78.0	7.77	77.0	76.0	74.8	73.5	72.5	71.5
Sephember	67.5	67.1	8	8	8	96.5	67.0	67.8	69.0	70.6	72.4	73.9	75.0	75.7	78.0	7.97	75.1	74.1	72.9	71.7	70.4	69.3
Cotoper	8	60 50 60 60 60 60 60 60 60 60 60 60 60 60 60	60 60 60	65.0	20.	55.1	65.5	4.0	67.6	68.9	70.7	72.4	73.5	74.2	74.5	74.2	73.6	72.6	71.4	70.1	68.7	67.8
November	0	25 25 30 30 30 30 30 30 30 30 30 30 30 30 30	25	0.0	8 -	3 .	4.8	2 .	65.0	1.98	67.4	88.8	6.69	20.5	70.7	70.5	70.0	68.9	67.7	8.8	98.0	65.3
Decoming 05.2 02.9 02.7 02.6 02.6	N N N	8	8 <u>.</u>	8 *	28 -	89 .	8 8 3	8 : 4	26	0.50	65.9	89.3	67.5	67.9	68.1	67.9	67.5	6.9	2.99	65.5	8.8	2 2.3

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ECONOMIZER ON		Jernary	February	March	₽ d⁄	Mary	ş	A	August	September	October	November	December	

TOTAL COOLING DEGREE HOURS PER YEAR:
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ECONOMIZER ON:

COMPRESSOR/CONDENSER ENERGY

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ECO BII Skeet 9 of 16.

file B11-HAND.WQ1
USE RESULTS ONLY FOR HAND-CALC BLDGS

BUILDING	COMPRESSO	CONDENSE	ECO B6/7	SAVINGS	ENERGY COST	•
NO.	kWH/Yr	kWH/Yr	Savings	kWH/Yr	SAVED/YEAR	_
120	6,234	included	0	3,260	\$220	
121	11,475	1,511	186	~ 6, 694	\$453	TRACE 600
161	4,470	Included	2,006	1,289	\$87	
162 4	4,470	0	2,006	1,289	\$87	
163#	4,470	0	2,006	1,289	\$87	-
164 #	4,470	0	2,006	1,289	\$87	
165 🕊	4,470	0	2,006	1,289	\$87-	
166 🖣	4,470	0	2,006	1,289	\$87	
167 🗸	4,470	0	2,006	1,289	\$87	
177	12,779	1,193	3,526	5,463	\$369	TRACE 600
178 -	15,974	1,491	5,588	- 6,211	\$420	
186	7,546	included	3,197	2,274	\$154	
190 ◀	34,548	Included	0	18,067	\$1,221	
197	12,691	Included	0	° 6, 637	\$449	
209	43,780	2,090	11, 449	18,001	\$1,217	
240	8,936	728	. 0	5,054	\$342	
241	16,565	2,186	0	9,806	\$663	TRACE 60
290	12,581	1,554	9,292	 2,533	\$171	TRACE 60
291	7,727	738	5,142	1,738	\$117	TRACE 60

thic on Collowing sommany analysis, but are included in Lec analysis sheet.

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SIR		0 237	0.768	(0.089)	(0.089)	0.748	0.593	0.383	0.766	0.926	0.519	0.777	(0.130)	(0 647)	0.639
Payback	Years	181.8	14.4	(350.0)	(350.0)	16.1	33.4	82.6	14.5	3.8	45.7	13.6	(281.2)	(105.5)	27.4
Savings	FCC \$	\$611	\$4.067	(\$91)	(\$91)	\$3,232	\$2,913	\$689	\$4.022	\$13.179	\$2.074	\$6.030	(\$260)	(\$883)	\$35,486
Savings	Total \$/Yr	\$43	\$342	(\$13)	(\$13)	\$271	\$240	\$54	\$338	\$1.122	\$169	\$508	(\$32)	(\$86)	\$2,944
Energy	FCC \$	\$2.578	\$5.294	\$1.019	\$1,019	\$4,321	\$4,913	\$1,799	\$5.249	\$14,237	\$3,997	\$7.756	\$2,003	\$1.374	\$55,561
Energy	Svg/Yr	\$220	\$453	\$87	\$87	\$369	\$420	\$154	\$449	\$1,217	\$342	\$663	\$171	\$117	\$4,749
O&M	\$CC.	(\$1,968)	(\$1,227)	(\$1,110)	(\$1,110)	(\$1,088)	(\$2,000)	(\$1,110)	(\$1,227)	(\$1,058)	(\$1,923)	(\$1,726)	(\$2,263)	(\$2,263)	(\$20,074)
O&M/YR	Saved	(\$177)	(\$110)	(\$100)	(\$100)	(86\$)	(\$180)	(\$100)	(\$110)	(\$62)	(\$173)	(\$155)	(\$204)	(\$204)	(\$1,805)
Investment	Total	\$7,893	\$4,922	\$4,452	\$4,452	\$4,365	\$8,021	\$4,452	\$4,922	\$4,244	\$7,713	\$6,922	\$9,077	\$9,077	\$80,514
Construction	Total	\$7,079	\$4,414	\$3,993	\$3,993	\$3,915	\$7,194	\$3,993	\$4,414	\$3,806	\$6,918	\$6,208	\$8,141	\$8,141	\$72,210
	Subtotal	\$4,538	\$2,830	\$2,560	\$2,560	\$2,510	\$4,612	\$2,560	\$2,830	\$2,440	\$4,435	\$3,980	\$5,219	\$5,219	\$46,293
Building	No.	120	121	161	162	177	178	186	197	508	240	241	280	291	Totals

Construction Cost....Installed Cost

OH & P.......Contractors overhead and profit 30%

Bond.......1% 作为现代的 计设计 计分类 Contingency.......Estimators contingency 10%

SIR.....Savings/(Cost+Maint+UPW)

Note: Minor differences between this summary and other tabular calculations are due to rounding errors.

metalling with the trace production of the source belong.

				Date Prepared		Sheet C)F
CONSTRUCTION COST ES	STIMAT	E		February 1	1993	<i>II</i>	16
Project				Project No.	Basis for E	stimate	
EEAP Limited Energy Study				16-403-10			
Location					Code A	(no design compe	ted)
Fort Hunter-Liggett, California							
Engineer-Architect							
Keller & Gannon Drawing No.		Estimato			Checked	Зу	
ECO-B11 (Economizer)		RJB			BIH		
		antity		bor	Per	aterial	Total
Line Hem	No. Units	Unit Meas.	Per Unit	Total	Unit	Total	Cost
Bldg 120							
Barrometric Relief Damper	2	ea	\$34	\$67	\$96	\$192	\$259
Opposed Blade Dampers	4	ea	\$61	\$242	\$205	\$820	\$1,062
Damper Actuator	4	ea	\$30	\$121	\$197	\$788	\$909
Controls	2	ea	\$90	\$180	\$316	\$632	\$812
Ductwork (Insulated 1")	100	lbs	\$6	\$579	\$4	\$436	\$1,015
Retrofit Existing Components	12	МН	40.1	\$481			\$481
Subtotal (Bldg 120)							\$4,538
Bldg 121							
Barrometric Relief Damper	1	ea	\$34	\$34	\$96	\$96	\$130
Opposed Blade Dampers	2	ea	\$61	\$121	\$205	\$410	\$531
Damper Actuator	2	ea	\$30	\$61	\$197	\$394	\$455
Controls	1	ea	\$90	\$90	\$316	\$316	\$406
Ductwork (Insulated 1")	50	Ibs	\$6	\$290	\$4	\$218	\$508
Retrofit Existing Components	20	МН	40.1	\$802			\$802
Subtotal (Bldg 121)							\$2,830
(2.03							
Bidg 161							
Barrometric Relief Damper	1	ea	\$34	\$34	\$96	\$96	\$130
Opposed Blade Dampers	2	ea	\$61	\$121	\$205	\$410	\$531
Damper Actuator		ea	\$30	\$61	\$197	\$394	\$455
Controls		еа	\$90	\$90	\$316	\$316	\$406
Ductwork (Insulated 1")		lbs	\$6	\$290	\$4	\$218	\$508
Retrofit Existing Components		МН	40.1	\$481			\$481
Penetrate Building		ea	\$50	\$50			\$50
Subtotal (Bidg 161)							\$2,560
(2.05)							
Sub Total (Sheet)							\$9,928
		 			1		

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				Date Prepared		Sheet	OF
CONSTRUCTION COST ES	AMIT	ΤE		February	1993	12	16
Project				Project No.		Estimate	
EEAP Limited Energy Study				16-403-10			
Location				<u> </u>	Code A	(no design com	peted)
Fort Hunter-Liggett, California					_		
Keller & Gannon					1		
Drawing No.		Estima	or	· · · · · · · · · · · · · · · · · · ·	Checked	Ву	
ECO-B11 (Economizer)		RJB			ВІН		
Line Item	No.	Jantity Unit	Per	abor	Per	Material	T-4-1
Line nem	Units		Unit	Total	Unit	Total	Total Cost
Bldg 162							
Barrometric Relief Damper	1	ea	\$34	\$34	\$96	\$96	\$130
Opposed Blade Dampers	2	ea	\$61	\$121	\$205	\$410	\$531
Damper Actuator	2	ea	\$30	\$61	\$197	\$394	\$455
Controls	1	ea	\$90	\$90	\$316	\$316	\$406
Ductwork (Insulated 1")	50	lbs	\$6	\$290	\$4	\$218	\$508
Retrofit Existing Components	12	МН	40.1	\$481			\$481
Penetrate Building	1	ea	\$50	\$50			\$50
Subtotal (Bldg 162)							\$2,560
BLDG 163,164,	165,	166,	167 ad	ded to	LCCI	+ sheet.	
Bldg 178							
Barrometric Relief Damper	2	ea	\$34	\$67	\$96	\$192	\$259
Opposed Blade Dampers	4	ea	\$61	\$242	\$205	\$820	\$1,062
Damper Actuator	4	ea	\$30	\$121	\$197	\$788	\$909
Controls	2	ea	\$90	\$180	\$316	\$632	\$812
Ductwork (Insulated 1")	50	lbs	\$6	\$290	\$4	\$218	\$508
Retrofit Existing Components	24	МН	40.1	\$962			\$962
Penetrate Building	2	ea	\$50	\$100			\$100
Subtotal (Bldg 178)							\$4,612
Bldg 241							
Opposed Blade Dampers	6	ea	\$61	\$363	\$205	\$1,230	\$1,593
Damper Actuator	3	ea	\$30	\$91	\$197	\$591	\$682
Louvers	2	ea	\$34	\$68	\$58	\$116	\$184
Controls		ea	\$90	\$90	\$316	\$316	\$406
Ductwork (Insulated 1")	_	Ibs	\$6	\$579	\$4	\$436	\$1,015
Penetrate Bldg		ea	\$50	\$100		\$0	\$100
Retrofit Existing Components	24	МН	40.1	\$962			\$962
Subtotal (Bldg 241)	-						\$3,980
					·		
Sub Total (Sheet)							\$11,151
	1						Ψ. 1,101
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Project No. 16-403-10 Code A (no december 1) 16-403-10 Code A (no december 2) 16-403-10 Code A (no december 3) Code A (no decemb	13 /6 late	0
EEAP Limited Energy Study		-
EEAP Limited Energy Study	lesign competed)	
Fort Hunter-Liggett, California Entimator Keller & Gannon	tesign competed)	
Engineer-Architect Keller & Gannon		
Checked By BIH Chec		
Drawing No. ECO-B11 (Economizer) Estimator RJB BIH		
Cuartity Labor Materix		
Bidg 177 Barrometric Relief Damper 1 ea \$34 \$34 \$96		
Barrometric Relief Damper	Total Cos	
Opposed Blade Dampers 2 ea \$61 \$121 \$205 Damper Actuator 2 ea \$30 \$61 \$197 Controls 1 ea \$90 \$316 Ductwork (Insulated 1") 50 lbs \$6 \$290 \$4 Retrofit Existing Components 12 MH 40.1 \$481		
Damper Actuator 2 ea \$30 \$61 \$197 Controls 1 ea \$90 \$316 Ductwork (Insulated 1") 50 lbs \$6 \$290 \$4 Retrofit Existing Components 12 MH 40.1 \$481 Subtotal (Bidg 177) 50		\$13
Controls		\$53
Ductwork (Insulated 1") 50 lbs \$6 \$290 \$4 Retrofit Existing Components 12 MH 40.1 \$481 Subtotal (Bldg 177) 50		\$45
Retrofit Existing Components 12 MH 40.1 \$481		\$40
Subtotal (Bldg 177) Bldg 186 Barrometric Relief Damper 1 ea \$34 \$34 \$96 Opposed Blade Dampers 2 ea \$61 \$121 \$205 Damper Actuator 2 ea \$30 \$61 \$197		\$50
Bldg 186 1 ea \$34 \$96 Barrometric Relief Damper 1 ea \$34 \$96 Opposed Blade Dampers 2 ea \$61 \$121 \$205 Damper Actuator 2 ea \$30 \$61 \$197	<u> </u>	<u>\$48</u>
Bldg 186 1 ea \$34 \$96 Barrometric Relief Damper 1 ea \$34 \$96 Opposed Blade Dampers 2 ea \$61 \$121 \$205 Damper Actuator 2 ea \$30 \$61 \$197	\$2.	2,51
Barrometric Relief Damper 1 ea \$34 \$34 \$96 Opposed Blade Dampers 2 ea \$61 \$121 \$205 Damper Actuator 2 ea \$30 \$61 \$197		
Barrometric Relief Damper 1 ea \$34 \$34 \$96 Opposed Blade Dampers 2 ea \$61 \$121 \$205 Damper Actuator 2 ea \$30 \$61 \$197		
Damper Actuator 2 ea \$30 \$61 \$197	\$96 \$	<u>\$13</u>
Damper Actuator 2 ea \$30 \$61 \$197		<u>\$53</u>
0-1-1-1		<u>\$45</u>
Controls 1 ea \$90 \$90 \$316		\$40
Ductwork (insulated 1") 50 lbs \$6 \$290 \$4		\$50
Retrofit Existing Components 12 MH 40.1 \$481		<u>\$48</u>
Penetrate Building 1 ea \$50 \$50		\$5
Subtotal (Bldg 186)		2,56
Same Cost as	190	
Sub Total (Sheet)	\$5.0	5,06

				Date Prepared		Sheet	OF	
CONSTRUCTION COST ES	TAMITE	Έ	*	February	1993	14	16	
Project				Project No.	Basis for	1		
EEAP Limited Energy Study				16-403-10				
Location					Code A	(no design comp	eted)	
Fort Hunter-Liggett, California]			
Engineer-Architect					İ			
Keiler & Gannon		Estimato			Checked	Ву		
ECO-B11 (Economizer)		RJB			він	•		
200 01. (2001011120.)		antity		bor		Material		
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost	
Bldg 197								
Barrometric Relief Damper	1	ea	\$34	\$34	\$96	\$96	\$130	
Opposed Blade Dampers	2	ea	\$61	\$121	\$205	\$410	\$531	
Damper Actuator	2	ea	\$30	\$61	\$197	\$394	\$455	
Controls	1	ea	\$90	\$90	\$316	\$316	\$406	
Ductwork (Insulated 1")	50	lbs	\$6	\$290	\$4	\$218	\$508	
Retrofit Existing Components	20	МН	40.1	\$802			\$802	
Subtotal (Bidg 197)							\$2,830	
Bldg 209					-			
Barrometric Relief Damper	1	ea	\$34	\$34	\$96	\$96	\$130	
Opposed Blade Dampers	2	ea	\$56	\$111	\$175	\$350	\$461	
Damper Actuator	2	ea	\$30	\$61	\$197	\$394	\$455	
Controls	1	ea	\$90	\$90	\$316	\$316	\$406	
Ductwork (Insulated 1")	50	lbs	\$6	\$290	\$4	\$218	\$508	
Retrofit Existing Components	12	МН	40.1	\$481			\$481	
Subtotal (Bldg 209)							\$2,440	
Bidg 240								
Opposed Blade Dampers	4	ea	\$56	\$222	\$175	\$700	\$922	
Damper Actuator	4	ea	\$30	\$121	\$197	\$788	\$909	
Controls	1 1	ea	\$145	\$145	\$482	\$482	\$627	
Ductwork (Insulated 1")		Ibs	\$6	\$579	\$4	\$436	\$1,015	
Retrofit Existing Components	24	МН	40.1	\$962			\$962	
Subtotal (Bldg 240)							\$4,435	
- 								
						<u> </u>		
Sub Total (Sheet)	1 1		i			ì	\$9,705	

			· · · · · · · · · · · · · · · · · · ·	Date Prepared	·	Sheet	OF
CONSTRUCTION COST E	STIMAT	Έ		February	1993	15	16
Project				Project No.	Basis for	Estimate	
EEAP Limited Energy Study				16-403-10	j		
Location					Code A	(no design com	peted)
Fort Hunter-Liggett, California					↓		
Engineer-Architect					l		
Keller & Gannon	<u> </u>	Estimate			Checked	Ву	
ECO-B11 (Economizer)		RJB			він		
		antity		bor	Per	Vaterial 1	Total
Line Item	No. Units	Unit Meas.	Per Unit	Total	Unit	Total	Total Cost
Bldg 290							
Opposed Blade Dampers	6	ea	\$61	\$363	\$205	\$1,230	\$1,593
Damper Actuator	3	ea	\$30	\$91	\$197	\$591	\$682
Louvers	2	ea	\$45	\$90	\$75	\$150	\$240
Controls	1	ea	\$145	\$145	\$482	\$482	\$627
Ductwork (Insulated 1")	100	lbs	\$6	\$579	\$4	\$436	\$1,015
Retrofit Existing Components	24	МН	40.1	\$962			\$962
Penetrate Building	2	ea	\$50	\$100			\$100
Subtotal (Bldg 290)							\$5,219
Bldg 291							
Opposed Blade Dampers	6	ea	\$61	\$363	\$205	\$1,230	\$1,593
Damper Actuator	3	ea	\$30	\$91	\$197	\$591	\$682
Louvers	2	ea	\$45	\$90	\$75	\$150	\$240
Controls	1	ea	\$145	\$145	\$482	\$482	\$627
Ductwork (Insulated 1*)	100	lbs	\$6	\$579	\$4	\$436	\$1,015
Retrofit Existing Components	24	МН	40.1	\$962			\$962
Penetrate Building	2	ea	\$50	\$100			\$100
Subtotal (Bldg 191)							\$5,219
Sub Total (Sheet)							\$10,438
							
Sub Total (ECO B-11)							\$46,292
Sales Tax 8%							\$3,703
Sub Total							\$49,995
Contractor O.H. & P 30%							\$14,999
Sub Total							\$64,994
Bond 1%							\$650
Sub Total							\$65,643
Estimating Contingency 10%							\$6,564
Sub Total							\$72,208
Total Probable Construction Cost							-900,000

Life Cycle Cost Analysis Summary ECO B11 Energy Conservation Investment Program (ECIP) Sheet 16 to 16

	Fort Hunter Lig : Retrofit Econom rtion Name: ECO#		Region No. 4		Project No. 16 Fiscal Year F	
	te: March 1993		Economic Life:	15 YEARS	Preparer: KELL	ER & GANNON
					-	
1. Investmer A. Construct			\$96,168			
B. SIOH	4011 00313		\$5,289			
C. Design C	ost		\$5,770			
D. Total Cos	st (1A+1B+1C)		\$107,227	·		
	alue of Existing E			\$0		
	lity Company Reb			\$0		
G. Total Inve	estment (1D-1E-1F	7)			\$107,227	
2. Energy Sa	avings (+)/Cost(-)					
Date of NIST	TIR 85-3273-X Use	d for Discount Facto	rs			
Energy	Cost	Saving	Annuai \$	Discount	Discounted	
Source	\$/MTB U/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)	
A. Elec.	\$19.81	323.4	\$6,407	11.70	\$74,959	• •
B. Dist	\$4.98	0.0	\$0 %	13.78	\$0.3	
C. Propane D. Demand	\$7.87	0.0	\$0.# -	14.16	\$0 ₹	
E. Other	\$108.60	0.0	k \$0 <i>≨</i>	11.70	 \$0 ≆	•
F. Total			\$6,407		\$74,959	
3. Non Energ	y Savings (+) or	Cost (-):				
A. Annual Re	curring (+/-)		\$0 ⊋			
	Factor (Table A)			11.12		•
(2) Discounte	ed Savings/Cost (3A x 3A1)			\$0 3	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1
B. Non Recu	rring Savings (+)	or Cost (-)	v.			
	_					
ltem ·	Savings(+)	Year of	Discount	Doscounted Sav-		
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4)		and the second second
a.						
b. ::			•			a fantjerm
C. .			<u> </u>			
d. Total				· ———	-	
A= =						
C Total Non E	Energy Discounted	d Savings (3A2+3Bd	4)	\$0`≆		
4. Simple Pay	hack 1G//2F3±3/	A+(3Bd1/Economic i	l Hall-	46 %	Vaam	<u>.</u>
5. Total Net D	iscounted Saving	s (2F5+3C):	L. 10/J.	16.7 ⁻ \$74, 9 59	Years	
6. Savings to	Investment Ratio	(SIR) 5/1G:		0.70		
	itemal Rate of Ret			Negative		,

Negative

Keller & Gannon

Engineers-Architects

COMPUTED BY BIH	ECO B/2	PROJECT 16-4-03-10
DATE HARCH 1993	INSTALL BOILER OXYGEN	
REV 19	TRIH CONTROLS	SHEET NOOFSHEETS

DESCRIPTION OF ACTION

Install oxygen trim controls on HW and Steam boilers. Energy is saved by improved combustion control; higher system efficiencies are achieved. Depending on load conditions, savings of 1.5% to 3.0% of Cuel use can be achieved.

FACILITIES INCLUDED

Only larger boilers can cost effectively be retrocit with such controls, buildings identified to evaluate include: BARRACHS COMPLEX

BUILDINGS (205, 206, 207, 208, 229 & 230), each

with 1,875,000 Bruth firing rate boilers.

Σ	Keller	&	Gannon

Engineers-Architects

COMPUTED BY BIH	ECO B12	PROJECT
DATE HARCH 1993		
REV19		SHEET NO. 3 OF 3 SHEETS

SCREENING ANALYSIS

FUEL OIL USE IN BARRACHS BOILER SYSTEMS

ZOS, 206, 207, 208, 229, 230 HAUE 7 IDENTICAL BLRS

TOTAL EXISTING FUEL OIL USE

HUAC 10,820 LIOBENIAR

DHW 2789 ×106 BTU/YR

TOTAL 13,609 ~106 BTU/YR

FUEL OIL COST \$4.98 / BTO
ANNUAL COST SAVINGS:

ASSUME 1/2 % SAUINGS (LESS SAUINGS ON THESE SHALL BOKERS)

13,609 x0.015 = 204 × 106 BTU/YR POTENTIAL SAUINGS # 4,98 × 204 = # 1016 /YR -11

LIFE CYCLE SAVINGS, ASSUME 15 YR LIFE

UPW = 13 i78 LIFE CYCLE ENERGY COST SAVINGS

\$1016 × 13.78 = \$14,009 LIFE CYCLE

COST SAVINGS.

IN 1982 A RETROFIT OZ TRUM CONTROL SYSTEM
COST ABOUT \$ 6600 EACH. TO ACHIEVE
\$ 14,009 SAUINGS, 7 OF THESE CONTROLS
HUST BE INSTACCED FOR A HIMIMUM
OF 7x\$6600 = \$46000 IN 1982 DOCCARS.

THE CONCEPT IS NOT ECONOMIC AT
FORT HUNTER-UGGETT BOKER SIZES

Σ	Keller	&	Gannon	

COMPUTED BY RUT	Eco	# B-13	PROJECT	6-403-01 EAD
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Keller & Gannon

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Keller & Gannon

COMPUTED BY RIH	Eco* B13	PROJECT 1/3-4-33-10
DATE	FUNDERTIVE PLE COLFIZS	
REV 19	ESTERNI SANCH CALLISMONS	SHEET NO. 3 OF 11 SHEETS
_ Effect Stungs:	46,379.9 KW/412 x /727,6	63-411,288) 27,663
	= 19,730.4 Km/72 x .05	1454 7/KWH
	· \$1,470/YR	
======================================		
2714 619	719 (PROTIBEDS 20) T	PME 500 PUH
	3,719 (0585) = 349,5	
Filter Cles L)	E60*6,7 - 75,112 Kunt	1/15
PRINCE -	- 75,112 (613,719-32 618719	
	= 32,673 KWA/TE . 0745	4 * (KWH) 1
	. \$2,436/TR	
		
208	19,250 , 32,673 = 34,473	KINHAL SOME
22975	75,112	10 M M M M M M M M M M M M M M M M M M M
230	34,473 x 0.074544/Kest	\$ 3,5 70 // SAVES
77 570	<u> </u>	
295 BILLY	pe 1,127,723	
BOUH	12- 1123,723x (0.565) · 6.	37.163
	95 072	
	N45= 93,825 (1127,123 -	631,163
		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	= 40, 814 KNH/mx x TC	7454 3 Kwitt
	= \$ 3,042/1R	
I +		

CONSTRUCTION COST ESTIMATE				Date Prepared February 1		SHEET (OF [[
Project EEAP Limited Energy Study				Project No. 16-403-10	Basis for Estim			
Fort Hunter-Liggett, California					Code A (no d	lesign competed)	
Keller & Gannon								
Drawing No.		Estimate	Of	<u> </u>	Checked By			
ECO-B13 (Indirect Evap. Pre-cooler)		RJB			BIH			
Line Item	No. Units	Unit Meas.	Per Unit	Total	Mater Per Unit	Total	Total Cost	
ndirect Evap. Pre-cooler	1	EA	\$2,550	\$2,550	\$850	\$850	\$3,400	
Ductwork	25	lbs	\$3	\$70	\$2	\$59	\$129	
Concrete Pad	4	CY	\$19	\$76	\$47	\$188	\$264	
1/2" Cu Piping (Water & Drain)		Ft	\$3	\$310	\$1	\$128	\$438	
Power & Control Wiring	1	Job	\$75	\$75	\$100	\$100	\$175	
Subtotal							\$4,406	
					•			
	1							
	+							

SA.

Keller & Gannon

COMPUTATION SHEET

COMPUTED BY		ECO B-13	PROJECT	
CHECKED BY DATE REV	19		SHEET NO. 5	OFSHEETS
	AR	ALYSES		
BCDG	128 50ML	BARRENES / BOO		
1	Individua	o thro-wall-Flain, total = ~	cu's on chie	& HO
	distr, but	an, total	reas.	
	one pr	ecoler con ser	ve 2 UNI45,	
	total	Constr. Cost	\$4406 x 60	=\$ 264,3
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	Energy	-0- 20000 111		1000
	• •	for power us		3.
		UPD = 11.7 for		
	1/0	7 × 1407 = \$ 16,	,462	
	DOES	COT PAY BACK		
2706		7,208,229,280		
BEUG				
	Potentra	el energy & co vious sheet -	st savings es	Hime tel
	on pre	vious skeet	8-3,048:/year	
	Life Cy	che Savings: 11.	7 x 3 04Z = \$35	, 5 7 0-
	1 Heylec	ing added ever co	00/er (en)	
	Seems	The a retro	1-15-105516he	
	P+C	1 afantal "	aves unthe	
	- Kerel			
	> Althou	of potontral	or indirect	
	evap	cooling, heat	pipes, etc.	-/31
	very	good In bar	vechi vocuis	
	lacal	ous of osa	R. selief	
	0352	ublies and	ayout of	Delivert
	precto	de installation	of such sys	tous.
				1 1 1 1 K 1

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY		B-13	PROJECT	
DATE	19			
REV.	19		SHEET NO6_ OF	//_SHEETS
	Air Flows 11			
	must also	A Section 1997 The Section 1997		
	There is 100 The for accomos	late Min	open area	
	major stre	eteral o	chonge	
	Which - would	d cost /	more than	1
	LCC suery	4 000 - 5	avings.	
Bldg 295	. There a	re over 1	20 individ	u
	FCus in 1		· · · · · · · · · · · · · · · · · · ·	
	costs won			
	compared to	the est	mated -	
	\$ 3042/gr			
	savings.			
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	FURTHER AC		JC(ED	p= 445 475 77 1
				1 JA 60 C
		Propagation of the state of the		
				

FORM 101-1/8

ECO B13 Sleet 7 of 11

FAX to Blain Horst-Keller & Gannon-

Conservation

2561 Westberry Drive

Mechanical

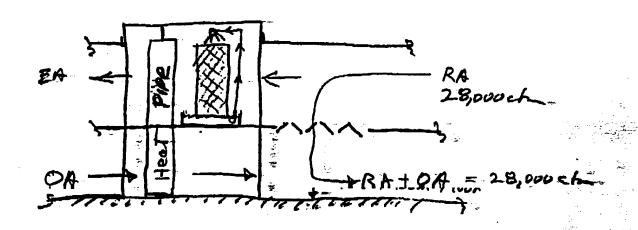
Santa Rosa, CA 95403

Re Fort Hunter Leggett

Systems Inc.

Phone and FAX 707-528-4016

Heut Pipo Dry evep. early Assembly

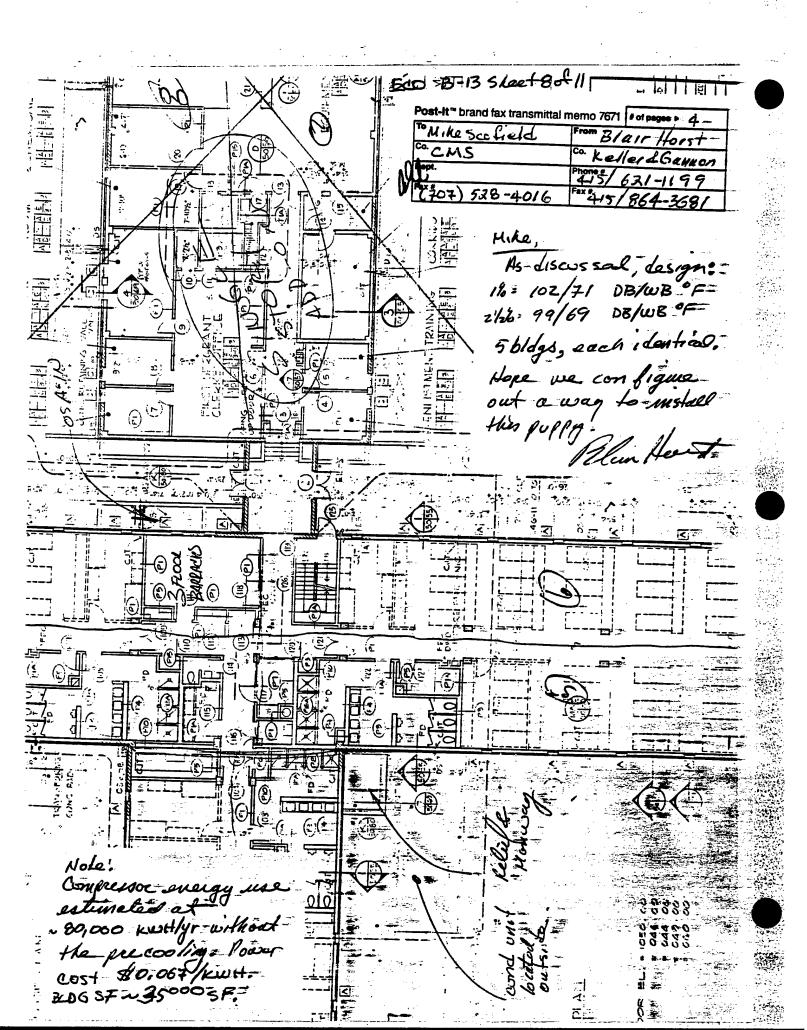


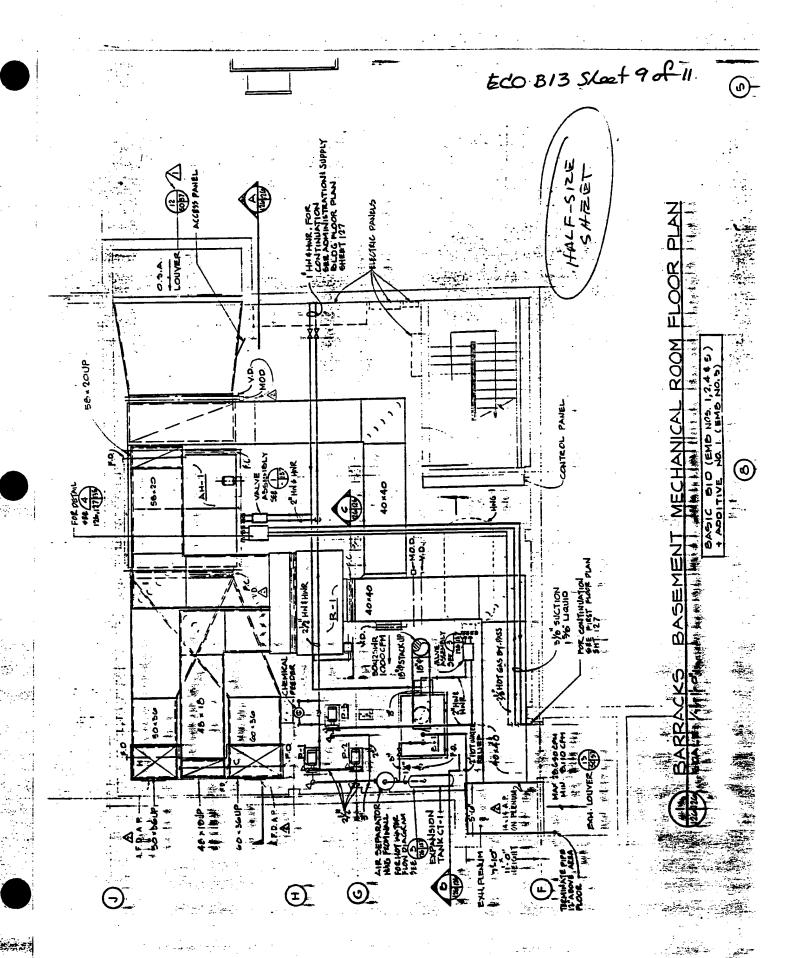
Blair - This is the idea I have inmind. This unit would cool 10-2°F-/77°FOutdoor Air down to= 78°F-DB 63.3°F-WAentaining your retrigger on DX coils. This is
based on a 63% over all indirect evop. cooling
ethiciency (90% setwethen Ethiciency to 70% heat-Proper
etticiency). No heat pipp maintenance since
we are using as wetted median evop. could-ond.
Not spraying the heat enchanger.

BOST

03-08-83 03-08-N -005-31-J

4





ECO B 13 Skeet 10 of 11 TRIC FAMELS SEMENT MECHANICAL ROOM FLOOR PLAN HALF SIZE BASIC BIO (EMB 1175, 1,2,4 (S) + ADDITIVE NO. 1 (EMB NO. 5) CATECL PANEL 50.30 - 3 & HOT GAS BY . PASS HOT DUCT COLD DUKT 10140

		600 B-13	
		sheet 11 of	-(1
	141 A 12 S A T	EVAPORATIUE PRE COOLER	·
	INDIRECT	RETROFIT	
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4)	3'.0"		:
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1000		0 033	
7		3.6"	
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		TYPICAL OF 5	
		3.FLOOR BARRACE	<u>s</u>
		BUILDINGS	
SA.	EXTS.	FORT HUNTER LIE	GETT
	LOUVERS	U	
		BLOGS 205, 20	27=
		208	
		229 8	230=
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:/			30/88
/			
- REM	OUE LOUVERS	INSTACL PREGOCER CELLS.	
	416H x 12 (100	WIDAL WIDTH)	
4"	DEEP LOUVE	RS 1/2" SETBACK FROH CONC.	
В	bam cace		
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Н	ax osa cet	ESIGN ZB,650 CFM	
	APPROX 82F	TO MOTORIZED DAMPER ZERT	4-Dect
	TONERON		
			-

£"2, -- .-

Keller & Gannon

Engineers-Architects

COMPU	TED BY	<u>s</u>	ECO #	B14	PROJECT	tl EEAP	
CHECKE DATE	MARCH_	1933	RESET DUAL.	-DUCT SA	_		_
REV		19	TEMPERATUR	E5	SHEET NO	OF SHE	EETS
	DESCRI	PTION	OF WORK				
-	CAL BU	ILDING'	S WITH DUAL	DUCT SYS	TENS RE	SET	-
-	COOLI	NO SU	PPLY AIR TEM	PERATURE	LOWERA	ND	
	OFCE	T-HEA	TING SUPPLY	AIR TEMPE	RATURE H	WHER	-:
			LOAD TIMES				<u> </u>
-						1	<u> </u>

	EVALUAT	TON SUM	MARY/APPRO	ACH.			
· '			0.10-10-10-10-10-10-10-10-10-10-10-10-10-1	CAPONI W	ACTE SI		
-	DUAL	- DUCT	SYSTEMS ARE	ENERGY	-AD 43		
_	AT AN	and sond	MON OTHER T	tion full (DAVI AI		
	PART	LOAD	CONDITIONS TH	HE MIXING	_boxes_n	אוי	
-	HoT	# COLD	SUPPLY AIR	TO VARY	THE SUP	PLY	
			ATURE TO ME				
	DNLY	THE M	KEP AIR TEM	PERATURE	CHANGES.		
-	THE	SYSTEM	MUST HEAT	THE SAME	CUMMIT	1 OF AIR	
•	AWA	COOL_7	THE SAME AN	R QUANTITY	EVEN	AT	
	0001	1000	CONDITIONS	ONLY THE	PROPART	אס	<u> </u>
· · · · -		497 7	COLD AIR S	UPPLIED TO	THE E	ואופב	
	OF-	10.1.10	HE POTAL	AID DUANT	7U S/A	15	$\overline{+}$
			· ·	- OXUFINA Y			
	THE	SAME					ഥ
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		OPNI	E THE ENER	AY DEAVI	EED DI	CONDITION	1 1
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			THAT TELL				
			HE TEMPER				++
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			10-10-6 1 14-	a Dill Bit	4 201	WHEDE	
			YSTEMS LIKE		i		==
			RNAL ZONE				<u> </u>
*						22 C 22 C 2 C 2 C 2 C 2 C 2 C 2 C 2 C 2	
			LOAD THE	COLD DECI	- IEMPE	WHUEE !	- 1

CONSTRUCTION COST EST	IMAT	E		Date Prepared February	Sheet Of		
Project EEAP Limited Energy Study	-			Project No.	Basis for Estimate		
Fort Hunter-Liggett, California				Gode A	(no design com	peted)	
Engineer-Architect					1		
Keller & Gannon Drawing No.		Estimate			Checked	Qu	
ECO-B14 Reset Dual-Duct Temperature	20	Esuman	×		Criecked	o y	
ECO-B14 Neset Dual-Duct Temperature		antity		Labor	 	Asterial	
Line item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Install Discriminator Controls to Query	-						\$0
Each Zone to Look for Peak Htg/Clg							-
Multi-Channel DDC Controller	1	EA	•	\$2,700	-	\$3,000	\$5,700
includes soft/programming	 		-			,	,
Temperature Contols for Coils	2	EA	-	\$1,000	\$500	\$1,000	\$2,000
Room Temp. Sensor/Transmitters		EA	-	-	\$610	\$3,660	\$3,660
Conduit/Wiring		LF	\$10	\$1,500	\$5	\$750	\$2,250
	<u> </u>						
Testing and Balancing	1	LS	•	\$2,000	-	-	\$2,000
Subtotal							\$15,610
Sales Tax @ 8%							\$1,249
Subtotal							\$16,859
Contractor OH & Profit @ 30%							\$5,058
Subtotal							\$21,916
Bond @ 1%							\$219
Subtotal							\$22,136
Estimating Contingency @ 10%							\$2,214
Total Probable Construction Cost							\$24,349

5.赞学 5

302 197 88 32.6 25.7 5440 5257 57.215 \$94.117 \$121.500

made that the Hot Deck Temperature would not be reset during Full Load Heating Hours

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Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

UTED BY US 1993	ECO#		16-40	1L EEAP 13-10
1919	SA TEMPERA	TURES	SHEET NO.	OFSHEE
ORDER OF IM	PIEMENTATIO	J		
				
THIS ECO !	WAS ASSUMED	NOT TO L	SE IMPL	EMENTED
		:		
			1	
- 				
				
				1. 电对应分数数 电影电影对象

FORM 101-1/8

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

Project No. 16-403-10 Location: Fort Hunter Liggett, California Region No. 4 Fiscal Year - FY96 a: Project Title: ECO-B14 Reset Dual-Duct Temperatures Bidgs. 80, 206, 241, 287, & 301 Discrete Portion Name: Analysis Date: March 1993 Economic Life: 15 YEARS Preparer: KELLER & GANNON 1. Investment Costs -A. Construction Costs \$121,500 B. SIOH \$6,683 C. Design Cost \$0 -D. Total Cost (1A+1B+1C) \$128,183 E. Salvage Value of Existing Equipment \$0 🌣 F. Public Utility Company Rebate ... \$0 🗻 G. Total investment (1D-1E-1F) \$128,183 2. Energy Savings (+)/Cost(-): Date of NISTIR 85-3273-X Used for Discount Factors Energy Coat :: Saving Annual \$ Discount Discounted Source \$/MTBU/(1) MBTU/YR(2) Factor(4) Savings(3) Savings(5) A. Elec. \$18.23 396 # \$7.217 11.70 \$84,442 2 B. Dist \$4.98 \$438 88 🤝 13.78 \$6,039 C. Propane \$7.87 32 😕 \$252... 14.16 \$3,566 D. Other NA -Ö \$0 æ: NA= NA= E. Demand Savings \$0 T 11.70 SOF F. Total -516 3. Non Energy Savings (+) or Cost (-): A. Annual Recurring (+/-) -\$0 E (1) Discount Factor (Table A) 11.12 (2) Discounted Savings/Cost (3A x 3A1) B. Non Recurring Savings (+) or Cost (-) Savings(+)---Doilcounted Sav-Coet(-)(1) Occur. (2) 🟗 Factor(3) ings(+)Cost(-)(4) EN PARTIE AND PROPERTY. \$0.00 15 🖘 SOF 0.56.4 \$0.E 15 -.: 0.56.≇ \$0.4 15 ≠ \$0 at 0.56 ₹ \$0 🐷 d. Total = C Total Non Energy Discounted Savings (3A2+3Bd4) 4. Simple Payback 1G/(2F3+3A+(3Bd1/Economic Life)): ... 16.2 Year

\$94.047

0.73 =

5. Total Net Discounted Savings (2F5+3C):

6. Savings to Investment Ratio (SIR) 5/1G: ...

7. Adjusted Internel Rate of Return (AIRR):

Keller & Gannon

Engineers-Architects

COMPUTED BY VS	ECO#B 15	PROJECT FHL EEAP
DATE MARCH 1993	CONVERT MULTIZONE UNITS	l ——
REV. 1993	TO VARIABLE AIR VOLUME	SHEET NOOFSHEETS

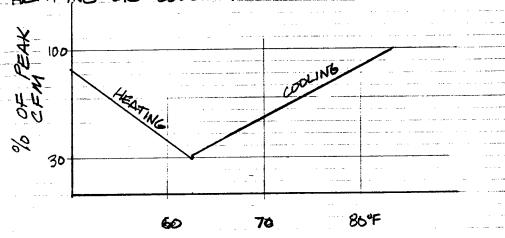
DESCRIPTION OF WORK

REDUCE FAN ENERGY CONFUMED IN BUILDINGS
205, 207, 208, 229 AND 230 BY CONVERTING
CONSTANT AIR VOLUME DUAL-DUCT AIR CONDITIONING
SYSTEMS TO VARIABLE AIR VOLUME SYSTEMS.

EVALUATION SUMMARY / APPROACH

THIS ECO FEATURES THE REMOVAL OF THE DUAL DUCT MIXING BOXES AND CONTROLS AND THEIR REPLACEMENT WITH DUAL - DUCT VAV BOXES.

AS SHOWN BELOW THE VARIABLE AIR VOLUME SYSTEM SAVES FAN ENERGY DURING ALL TIMES DURING THE YEAR EXCEPT THOSE HOURS SPENT AT FULL LOAD HEATING OR COOLING.



THE BARRACKS BUILDINGS WERE ASSUMED TO BE DOMINATED BY EXTERNAL LOADS, THEREFORE THE PEQUIRED AIR FLOW WITH TRACK OUTSIDE TEMPERATURE

Keller & Gannon

Engineers-Architects

COMPUTED BY CHECKED BY DATEMARCH REV	19 93	ECO B 15 CONVERT DUAL - DUCT UNITS TO VARIABLE AIR VOLUME	PROJECT FHL EE 16403-10 SHEET NO. 2 OF 5	SHEETS
	N -			
THE	FOLLOWIN	us schedule was derive	D FIZOM THE	

	SCHEDULE WAS DERIVED FIZOM THE
LOCAL WEATHER	- DATA TO APPROXIMATE THE AIR
QUANTITY SUPPLI	ED BY THE VARIABLE AIR VOLUME
SYSTEM.	
and the second s	a supposed and a 11- continue to a 1- passage of the passage of th
	THE RESIDENCE OF THE PROPERTY

TEMPERATURE RANGE	PERCENT TOTAL CFM	PERCENT OF YEAR AT THIS LOAD
OVER 804	100%	7%
50°F TO, 80°F	80%	52%
30°F 10 50°F	40%	40%
BELOW 30°F	105%	1%

ORDER OF IMPLEMENTATION

THIS ELO WAS ASSUMED TO BE IMPLEMENTED.

ECO - B15 Convert Multizone HVAC System to Variable Air Volume

Fac.	Fan Amps	Sd	Full Load	Full Load VAV System	Savings	Energy C	Savings Energy Cost Saved O&M Cost Saved	O&M Cos	st Saved	Constr.	Constr. Investment Pay-	_	SIR
Š.	SA Fan	RA Fan	SA Fan RA Fan kW hr / Yr kW hr / Yr.	kW hr / Yr.	kW hr / Yr	\$/Yr	\$ 227	\$/ ∀ r	\$227	Cost \$	₩	Back	
202	55	23	153,424	101,260	52,164	\$3,246	\$37,973	(\$200)	(\$2,224)	\$24,458	\$27,271	8.95 1.31	1.31
207	54	21	147,523	97,365	50,158	\$3,121	\$36,513	(\$200)	(\$2,224)	\$24,458	\$27,271	9.34	1.26
208	54	21	147,523	97,365	50,158	\$3,121	\$36,513	(\$200)	(\$2,224)	\$24,458	\$27,271	9.34 1.26	1.26
229	59	23	161,292	106,453	54,839	\$3,412	\$39,921	(\$200)	(\$2,224)	\$24,458	\$27,271	8.49	1.38
230	46	22	134,410	88,710	45,699	\$2,843	\$33,267	(\$200)	(\$2,224)	\$24,458	\$27,271	10.32	1.14
		Totals	744,171	491,153	253,018	\$15,743	253,018 \$15,743 \$184,188	(\$1,000)	(\$11,120)	(\$1,000) (\$11,120) \$122,292	\$136,355	9.25	1.27

Annual Full Load Energy Consumption was calculated from measured phase voltage readings and operating hours of the

Full load kWHr / Year consumption of supply and return fans are reduced to 66% of existing usage due to the proposed VAV retrofit.

Energy cost savings are based on the year-round, continuous usage rate for power.

Annual O&M efforts for VAV system components are expeced to require an additional 5 MH per year of effort. At \$40 per hour, annual cost per building VAV sytem is \$200.

CONSTRUCTION COST EST	MAT	Ε		Date Prepared February	993 4 5		
Project EEAD Limited Energy Study				Project No. Basis for Estimate			
EEAP Limited Energy Study Location				<u> </u>	Code A	(no design comp	eted)
Fort Hunter-Liggett, California Engineer-Architect							
Keller & Gannon							
Drawing No.		Estimate	" すぐ		Checked (BIH	
ECO-B9 VAV Retrofit	Out	antity	70	Labor	ļ	laterial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Building 207							
		ļ	ļ				4
Double-Duct VAV Box with T-stat	8	EA	\$300	\$2,400	\$650	\$5,200	\$7,600
and duct static pressure sensor							
20 HP Variable Frequency Drive	1	LS	-	\$1,200	-	\$3,000	\$4,200
installed w/ actuator							
Remove Constant Volume Mixing Boxe	8	LF	\$250	\$2,000		\$0	\$2,000
							44.000
Testing and Balancing	1	LS	-	-	-	-	\$1,880
				<u> </u>			
	···········						
							· · · · · · · · · · · · · · · · · · ·
							1-
	-						
							<u> </u>
Subtotal							\$15,680
Sales Tax @ 8%							\$1,254
Subtotal Control Of the Control Of t			_			!	\$16,934 \$5,080
Contractor OH & Profit @ 30%							\$22,015
Subtotal	···						\$220
Bond @ 1% Subtotal							\$22,235
Estimating Contingency @ 10%							\$2,223
Total Probable Construction Cost							\$24,458
Total 1 Todable Collect design Cost							+- 1, 100

Life Cycle Cost Analysis Summary **Energy Conservation Investment Program (ECIP)**

ECO B15 SHT 5 085

Fort Hunter Liggett, California Location: Region No. 4 Project No. **ECIP Facility Energy Improvements** Project Title: Fiscal Year FY95 ECO B15 Convert Multizone HVAC Systems to Variable Air Volume Discrete Portion Name: Analysis Date: June 1993 Economic Life: 15 YEARS Preparer: KELLER & GANNON 1. Investment Costs A. Construction Costs \$122,292 B. SIOH \$6,726 C. Design Cost \$7,338 D. Total Cost (1A+1B+1C) \$136,355 E. Salvage Value of Existing Equipment \$0 F. Public Utility Company Rebate \$0 G. Total Investment (1D-1E-1F) \$136,355 2. Energy Savings (+)/Cost(-): Date of NISTIR 85-3273-X Used for Discount Factors: October 1992 Saving Annual \$ Energy Cost **Discount** Discounted Source \$/MTBU/(1) MBTU/YR(2) Savings(3) Factor(4) Savings(5) A. Elec. \$18.23 863.6 \$15.743 11.70 \$184,188 B. Dist \$4.98 0 \$0 13.78 \$0 \$7.87 0 C. Propane \$0 14.16 \$0 D. Other NA 0 \$0 NA NA E. Demand Savings \$0 11.70 \$0 864 F. Total \$15,743 \$184,188 3. Non Energy Savings (+) or Cost (-): A. Annual Recurring (+/-) (\$1,000)(1) Discount Factor (Table A) 11.12 (2) Discounted Savings/Cost (3A x 3A1) (\$11,120)B. Non Recurring Savings (+) or Cost (-) Year of Item Savings(+) Discount **Doscounted Sav-**Cost(-)(1) Occur. (2) Factor(3) ings(+)Cost(-)(4)\$0 15 0.56 a. \$0 \$0 15 b. 0.56 \$0 \$0 C. 15 0.56 \$0 SO d. Total 0.00 \$0 C Total Non Energy Discounted Savings (3A2+3Bd4) (\$11,120) 4. Simple Payback 1G/(2F3+3A+(3Bd1/Economic Life)): 9.25 Years 5. Total Net Discounted Savings (2F5+3C):

6. Savings to Investment Ratio (SIR) 5/1G:

7. Adjusted Internal Rate of Return (AIRR):

\$173,068

1.27

5.67%

Keller & Gannon

Engineers-Architects

	COMPUTED BY RUB FCO B-17	PROJECT 16-403-10
	CHECKED BY TOLH DATE TEB 1992 REVOLUTE TRANSFORMER	
	REV	SHEET NO OF SHEETS
-		
	PESCENTIAL OF ACTION	
	THE EXISTIM 150 KVA TRA	
	LOCATED IN BLOG 301 LOUIS) BE
!	PETIONED FROM THE COMPU	TER ROOM
	AHO PLACED IN A HON-AIR	COHA NOTED
	SPACE THE LOUD SIGHIFIC	
	PERUE THE AR CONDITION	
	FOR THE COMPUTER ROOM A	
	SAVE ON ELECTRICAL COSTS	•
	A TRACE 600 PUH WAS MAD	E FIRST
	WITH THE TRANSFLEMENT LOAD	
	HEXT ILITHOUT. ECOTS # AT	
	LERE CONSIDERED ITTPLEMENT	TED 1H
	BOTTH CASES,	
FORM 101-1/8		
		
		

1

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

WITH KAME.

をCOB-17 SHEET 2085

V 600 € PAGE ... !

".IFORNIA TITLE 24 COMPLIANCE - ALTERNATIVE 3

CRAC

-- CALIFORNIA TITLE 24 COMPLIANCE REPORT

ENERGY USE SUMMARY

-			PERCENT OF TOTAL	TOTAL	ADJUSTED UNIT SOURCE
	ELEC"	GAS 🛋	ENERGY	ENERGY	ENERGY
	(kih/yr)	(kBtu/yr)	(%)=	(kBtu/yr)	(kBtu/yr-sf)
Primary Heating	0.0	25,995.8	5.6 a	27,364.0	2.9
Primary Cooling			•		
Compressor	13,891.0	0.0	10.2 -	142,244.0	14.9
Tower/Cond Fans	2,528.0	0.0	1.9 🍜	25,886.5	2.7
Condenser Pump	0.0	0.0	0.0 🖫	0.0	0.0
Other Accessories	3,331.2	0.0 🕹	2.5	34,411.6	3.6 🖛
Auxiliary					
Supply Fans	60,840.6	0.0 ==	44.8	623,008.9	65.2
Circulation Pumps	0.0	0.0	0.0	0.0	0.0 :~
Base Utilities	. 0.0 .	0.0 😅	م ند 0.0	0.0	: 0.0 🎜
Subtotal	60,840.6	0.0 =	44.8	623,008.9	65.2
hting	47 ,69 1.6	0.0 =	35.1	488,362.7	49.8
ceptacle	0.0 %	0.0 🎄	الله 0.0	0.0	0.0 ~
Domestic Hot Water	0.0	0.0 =	0.0 ≤	0.0.2	0.0
Cogeneration	0.0 🍱	0.0 🍜	0.0=	0.0	: 0.0 ≥:
Totals	128,282.3	25,995.8	100.0 1	,340,977.6	139.0

ECO 13-17 SHERT 3 025 PAGE

Trane Air Conditioning Economics

By: Trane Customer Direct Service Network

CALIFORNIA TITLE 24 COMPLIANCE - ALTERNATIVE 3

MZ-CRAC

----- CALIFORNIA TITLE 24 COMPLIANCE REPORT

Weather Name PASOROBL
Gross Conditioned Floor Area (sqft) 9,800
ACM Multiplier 1.025

ENERGY USE SUNMARY

			PERCENT	TOTAL	ADJUSTED
			OF TOTAL	SOURCE	UNIT SOURCE
	ELEC .	GAS.4≅	ENERGY	ENERGY	ENERGY
	(kilh/yr)	(kBtu/yr)	(X)==	(kBtu/yr)	(kBtu/yr-sf)
Primary Heating	0.0	25,995.8	5.9	27,364.0	2.9
Primary Cooling					
Compressor	10,580.3	0.0	8.2	108,342.5	11.3
Tower/Cond Fans	2,243.8	0.0	1.7 -	22,976.4	2.4 8
Condenser Pump	0.0	0.0	0.0	0.0	0.0
Other Accessories	2,913.9	0.0	2.2	29,838.4	3.1
Auxiliary				-	
Supply Fans	58,547.8	0.0 🕮	45.2	599;531.3	62.7
Circulation Pumps	0.0.	0.0	0.0	0.0	0.0 -
Base Utilities	0.0 🚐	0.0 🎩	0.0.3	0.0	ند. 0.0
Subtotal	58,547.8	0.0 ≆	45.2	599,531.3	62.7
Lighting	47,691.6	0.0	36.8	488,362.7	49.8
Receptacle	0.0	0.0	0.0.5	0.0	0.0
Domestic Hot Water	0.0	0.0 5	0.0	0.0	. 0.0 ~
Cogeneration	0.0	0.0 🛎	0.0 <	0.0	0.0
Totale	121 077 £	25 805 8	100.0	274 415 7	472 T

Keller & Gannon

Engineers-Architects

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FORM 101-1/8

Life Cycle Cost Analysis Summary ECO B17 Energy Conservation Investment Program (ECIP) Sheet 5 to 5

Project No. 16-403-10 Region No. 4 Fort Hunter Liggett, California Location: Fiscal Year = FY96 # Project Title: Relocate Transformer, Building 301 Discrete Portion Name: ECO# B-17 Preparer: KELLER & GANNON Economic Life: 20 YEARS Analysis Date: March 1993 1. Investment Costs \$2,400 A. Construction Costs \$132 B. SIOH \$144 C. Design Cost 2,676 D. Total Cost (1A+1B+1C) \$0 * E. Salvage Value of Existing Equipment \$0 --F. Public Utility Company Rebate \$2,676 G. Total investment (1D-1E-1F) 2. Energy Savings (+)/Cost(-): Date of NISTIR 85-3273-X Used for Discount Factors Discounted Discount Annual \$ Saving Cost -Energy Savings(3) Factor(4) Savings(5) MBTU/YR(2) \$/MTBU/(1) Source -\$5,700 \$302 . 14.53 21.5 \$18.23 A. Elec. \$0.2 0.0 \$0 3 17.63 \$4.98 B. Dist \$0 m 18.59 0.0 \$0.3 C. Propane \$7.87 14.53 \$2,840 \$195 1.8 \$106.60 D. Demand E. Other \$8,540 स्तराः F. Total -3. Non Energy Savings (+) or Cost (-): \$0 T A. Annual Recurring (+/-) 13.59 (1) Discount Factor (Table A) (2) Discounted Savings/Cost (3A x 3A1) B. Non Recurring Savings (+) or Cost (-) Doscounted Sav-Savings(+) Year of Item --ings(+)Cost(-)(4) Cost(-)(1) Occur. (2) b. 🌫 C. 😅 d. Total ... C Total Non Energy Discounted Savings (3A2+3Bd4) 4. Simple Payback 1G/(2F3+3A+(3Bd1/Economic Life)): \$8,540 5. Total Net Discounted Savings (2F5+3C): 3.19 + 6. Savings to Investment Ratio (SIR) 5/1G: 21.50% 7. Adjusted Internal Rate of Return (AIRR):

Keller & Gannon

Engineers-Architects

COMPUTED BY PUT CHECKED BY PUT DATE FREV.	 FEOT B-18 DZAKE OPTIMIZER WIEG DEGGERATION	· · · · · · · · · · · · · · · · · · ·
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THE COOLING SETPONT IS OHLY LOW EHOWAH
TO SATIST THE ZINE LITH THE GREATEST
= LOAD. THS LILL MITHINIZE TITE, AMOUNT
- OF PEHENT BEWLINARD FOR THE OTHER
- ZOHES MATCH BOTH HEATING AND
COOLING LOADS LILL BE PEDUCED.
CHAPEL BLOG 190
SHAP BE BESS 110
ENFRAY SAVINAS.
+
ENFRAY SAVINAS.
TORUX INTE/DAYX (7 DATS/WEEK × 26 WELLY)
ENTERGY SAVINGS: ZOKUX INTE/DAYX (7 DAS/JEEK × 26 HERY) = 3,640 KWH/TR
ENFRAY SAYNHAS: 20 KW X INTE/DAY X (7 DATS/JEEK X 26 WELLY) = 3,640 KWH/TE THEATER BEDG 81
ENTERGY SAVINGS: ZOKUX INTE/DAYX (7 DAS/JEEK × 26 HERY) = 3,640 KWH/TR
ENFRAY SAYNHAS: 20 KW X INTE/DAY X (7 DATS/JEEK X 26 WELLY) = 3,640 KWH/TE THEATER BEDG 81
ENTER BEDG 81 ZOKWX /2 HTZ/DAY Y (3 DAYS/WEEK Y 26 WEEK/A) ZOKWX /2 HTZ/DAY Y (3 DAYS/WEEK Y 26 WEEK/A)
ENTER BEDG 81 ZOKWX /2 HTZ/DAY Y (3 DAYS/WEEK Y 26 WEEK/A) ZOKWX /2 HTZ/DAY Y (3 DAYS/WEEK Y 26 WEEK/A)
ENTER BEDG 81 ZOKWX /2 HTZ/DAY Y (3 DAYS/WEEK Y 26 WEEK/A) ZOKWX /2 HTZ/DAY Y (3 DAYS/WEEK Y 26 WEEK/A)
ENTER BEDS 81 20 KW X /2 HTV/DAY X (3 DAYS/WESK Y 26 WELL) 20 KW X /2 HTV/DAY Y (3 DAYS/WESK Y 26 WELL)
ENTER BEDG 81 20 KW X /2 HTV/DAY X (3 DAYS/WESK Y 26 WELL) 20 KW X /2 HTV/DAY Y (3 DAYS/WESK Y 26 WELL)
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Keller & Gannon

Engineers-Architects

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		HE OPTIMIZED		
REV 1	<u>'- 1055</u>	CAVINCE	SHEET NO.	OF 5 SHEETS
- 44.00				
CHAPE				
364	D KWH/T	ex.07454	KWH =	\$271/12
15 YE STVW	KG = \$27	1x 11.70 - +	3775	
- TILLATE				
THEATE				
730	KUH TEX.	07454 KWH =	458/90	
15 TR STUIL	45: \$58	x11.70 : \$ //	579	
605				
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CONSTRUCTION COST EST	IMAT	ΓΕ	· · · · · · · · · · · · · · · · · · ·	Pate Prepared February	1993	Sheet 3	OF 5
Project EEAP Limited Energy Study				Project No. 16-403-10	Basis for	_	
Fort Hunter-Liggett, California				<u> </u>	Code A	. (no design comp	eted)
Keller & Gannon							
Drawing No. ECO-B18 Zone Optimizer Control		Estimat RJB	10		Checked BIH	Ву	
		antity		bor		/aterial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
TYPICAL ZONE OPTIMIZER CONTRO			1				
Temperature Controller	1	Ea	\$33.91	\$34	\$165	\$165	\$199
Temperature Sensor	3	Ea	\$28.06	\$84	\$95	\$286	\$371
Relay	3	Ea	\$47.63	\$143	\$62	\$185	\$328
Wiring	1	Job	\$240	\$240	\$100	\$100	\$340
Subtotal, Optimizer Control					1.33	4.00	\$1,238
Sales Tax 8%							\$99
Contractor O.H. & P 30%							\$99
Sub Total					-		\$1,436
Bond 1%							\$14
Sub Total							\$1,450
Estimating Contingency 10%							\$145
Total Probable Construction Cost						<u> </u>	\$1,595
				•			
							· · · · · · · · · · · · · · · · · · ·
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		Î					

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

ECO B18

6.6. ₹ Years

\$3,169

1.78 ₹

12.70% -

Sheet 4 fo 5

	Fort Hunter Ligge Add Zone Optimize on Name: ECO# E	er Control	Region No. 4		Project No. 16 Fiscal Year F	
	on Name: ECO# E : March 1993	-16, Blug 🗪 190	Economic Life: 15	YEARS	Preparer: KELL	ER & GANNON
1. Investment	Costs					
A. Construction	on Costs		\$1,595			
B. SIOH			\$88			
C. Design Co	st		\$96			
	(1A+1B+1C)		\$1,778	 .		
	alue of Existing Equ			\$0 -		
	ty Company Rebat	•		\$0 -		
G. Total Inves	stment (1D-1E-1F)				\$1,77 8	
	vings (+)/Cost(-):	(Discount Footon				
Date of NIST	H 85-32/3-X US90	for Discount Factors				
Cnorm.	Cost	Saving	Annual S	Discount	Discounted	
Energy Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)	
Scurce	4/m100/(1)	MB10/ III(2)	OETH ISO(O)	,		
A. Elec.	\$21.84	12.4	\$271	11.70	\$3,169	
B. Dist	\$4.98	0.0	\$0 =	13.78	\$ 0 <i>≆</i>	
C. Propane	\$7.87	0.0	\$ 0 ¥	14.16	\$0⊉	
D. Demand	\$108.60	0.0 k	≈ \$0 ₹	11.70	\$0.≊	
E. Other						
F. Total			\$271		\$3,169	-
3. Non Energ	y Savings (+) or C	ost (-):				
			**			
A. Annual Re			\$0≇	44.46		
· ·	Factor (Table A)			11.12	··· •0=	•
(2) Discounte	d Savings/Cost (3/	(x 3A1)			\$0 E	
B. Non Recur	ring Savings (+) o	r Cost (-)				*** °.
item ···	Savings(+)	Year of	Discount	Doscounted Sav-		
ILEATT	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4)		
	O084(-)(1)	Occur. (2)	1 2001(0)			
8. ÷						i de la companya di salah di s
e b. ≈	·					
C. =					-	- 10 10 - 10 - 10 - 10 - 10 - 10 - 10 -
d. Total					-	
				1 44		
C Total Non F	Energy Diecounted	Savings (3A2+3Bd4)		\$ 0≇		amagil termina ata afinipa
- ,				-		

4. Simple Payback 1G/(2F3+3A+(3Bd1/Economic Life)):

5. Total Net Discounted Savings (2F5+3C):

6. Savings to investment Ratio (SIR) 5/1G: .

7. Adjusted Internal Rate of Return (AIRR):

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

Sheet 5 fo 5 Project No. 16-403-10

ECO B18

Cocamon.	Port Hunter Lig		1 logion 140. 4		Fiscal Year FY96
	Add Zone Optim				Fiscal Teal F190
	tion Name: ECO#	F 13-18, Blag 81	Connectic Life:	15 YEARS	Property VELLER & CANING
Analysis Dat	e: March 1993		Economic Life:	15 TEARS	Preparer: KELLER & GANNO
1. Investmen				_	
A. Construct	ion Costs		\$1,595	-	
B. SIOH			\$88	-	
C. Design C	ost		\$96	_	
	t (1A+1B+1C)		\$1,778		
	alue of Existing E			\$0	_
	ity Comp <mark>any Reb</mark>			\$0	
G. Total Inve	stment (1D-1E-1F	7)			\$1,778
2. Energy Sa	vings (+)/Cost(-)	: d for Discount Facto	ire.	-	
Date of 1415 t	IN 05-02/5-X 056	d for Discourier acto			
Energy	Cost	Saving	Annual \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
A. Elec.	\$21.84	2.7	\$58	11.70	\$680
B. Dist	\$4.98	0.0	\$0 =	13.78	\$0 :
C. Propane	\$7.87	0.0	\$0.≆	14.16	\$0 🕾
D. Demand	\$108.60	0.0	_k \$0. 	11.70	\$ 0 ÷
E. Other		-	•		
F. Total			\$58		\$680
3. Non Energ	y Savings (+) or	Cost (-):		_	
A. Annual Re	carring (+/s)		\$0 ≆		
	Factor (Table A)			11.12	
	ed Savings/Cost (3A x 3A1)			\$ 0.≆
B. Non Recu	rring Savings (+)	or Cost (-)			
Item	Savings(+)	Year of	Discount	Doscounted Sav	
166111	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4)	
			• •		2
a.	<u> </u>		→ .		
b. .			- ••		
C.			o		
d. Total					
C Total Non	Energy Discounte	d Savings (3A2+3B	d 4)	\$ 0 =	
4. Simple Pay	/back 1G/(2F3+3	A+(3Bd1/Economic	Life)):	30.6	Years
5. Total Net	Discounted Saving	gs (2F5+3C):		\$680	
	Investment Ratio			0.38	
7. Adjusted I	nternal Rate of Re	turn (AIRR):		Negative	
₹		• •		•	

Engineers-Architects

COMPUTED BY 8/	<u># </u>	ONSOLODA		PROJECT 16-403-10
DATE MARCH	19 93	STORK		
REV	19	ECO B	20	SHEET NOOFSHEE
In an in 1982 was m	energy, the	sollowing	nducted b recom n	ry PG&E rendation
REFRIGERATION				
L5. Consolidate				
	eating faci shipments a larger stor retaining o	llities. Due to are made less fr age capacity. only enough refr	the remoteness requently than a Savings could b	lities for the various of the base, food normal, requiring be accomplished by ge for daily consumption
-	Projected S Payback Per			, \$2,631.28/ yr
, 	:			
reasons	+ be p	ractical.	not wor	storage of the hinclude:
· Zatino	Facility Facili	ies include	the cons	olidated nachbar(B=200
& LOC	inge (B-101),	Each o	a Resterant F these
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ave 2×154 125 pc	ATTES. s and mobilis	confus.	is sisting	of abuse unting and practicle to
ave exist respondence	ge.	Hes Woul	L RIL IM	precticle to

Keller & Gannon

Engineers-Architects

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DESCRIPTION C		
REMOVE E	XISTING BURNERS an	BOILERS WITH
LOW COMBUSTION	EFFICIENCIES OR RE	EPLAKE BOILERS
<u> </u>	DIANT OR CONVECTIVE	
_ WITH MIGH EFF	HEIENCY BURNERS C	R NEW HIGH
ERFICIENCY 80	oiler /	
- FACILITIES I	NCLUDED_	
REFER TO AT	TACHED SPREADSHE	ET PRINTOUT.
	SG CALCULATIONS	
	USAGE OF THE EXIS	TING UNITS
	OR OTHER CALL, ME	
USAGES HAVE	BEEN VERTEIED WIT	M RECORDS
	IERY. THE FIRING E	
OBTAINED FROM	MANUES PUBLISHE	ED PATA,
OBTAINED FRO	OM ALNUAL EFFICEN	CY TEST
	THER LOSSES WELL IN	
INSPECTION.		
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HIGH EFFICIENCY BOILER CONVERSION

<u>S</u>	ALE STATE STATE STATE	Boller Syste	m Data		Existing Boller System passes	ler Svetem	3000				
ż	Installation Name		System	Cenecity	Fisher	7	112,70				
		70.1				ł		CONNECTION	LANGO-INUS	General	ž
	-	8	edá:	HOLE	<u></u>	Eary Eary					ā
P 101	Open Din Cone (Haciende)	Prometre	AHI LIMBION	900	12.5						
-		5 36 65	21.1315an - 12	oon'oos	86.38 86.38	•	6.0%	*6.4 *6.	 %	3.0%	84.8%
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	Hacienda, Dwelings	Electric	ERPH	30 x 3kW=90kW	٠	•		•	•	ı	
	Change lan	A Sharing	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Property of the second of the						•	•
P 128	Officers Querters Military	Propere	FCU-HWB/CW	567.000	80		9	1	100		
407	Artura Dide Den Otter			2001	20.3		5	85.4	%5.5°	2.0%	73.0%
•	POLICE CON BOAR INCH		AHCHHOP/DX	284,000+	36.0%		8.0%	5.0%	2.0%	2.0%	260.090
	Admin Bidg R&D - Electronics	Electric	Wind Ao + ER	30kW Ht, 2x1.5R	•	•	•	•			
P 209	AAFES Snack Bar	Properse	RTAHU-HWB/DX	280.000	77.2%		8	Jac H	à	i	.
P 252	Vehicle Maint Shop DS	2	HWP.111/10	000				200	80.3	80.0	67:10
9	V-1-1- V-1-40			OOO'OCO	5		40%	3.0%	2.0%	2.0%	73.0%
8	Vertice Maint Shop OHG		HWB-UH/R	270,000	82.7%		¥.0%	3.0%	2.0%	2.0%	71 7%
P 258	Vehicle Maint Shop ORG	Fuel Oil	HWB-UH/R	000'059	86.28		4.0%	3.0%	28	200	73 0%
S 290	Electron Equip Facility	Properse	AHU-PROP/CW	1,020,000	90.8%		8	484	200	300	90.07
		Electric	Window AC/ER	36.8 kW				! '	?	R 0.0	80.3
S 291	Cont Humid Warehouse	Properse	AHU-STM/DX	1,020,000	78.8%	30%	7.08	404	2000	è	. 8
288	Eni Bernacka w/o Dining	Properne	FCU-HWB/CW	3,250,000	7.12		80%	8.0%	20%	308	46,078 36,078
P 642	Detached Letrine/Shower	Properse	HWH/TK-Cho	480.000	75.22		ě	1		200	R 1.00
				200	43.5%		85.	4.0%	2.0%	3.0%	59.2%

HIGH EFFICIENCY BOILER CONVERSION

		New Boiler System	rstem Losses	9								
2 4	eman rottelleteri									Energy	Energy	Annual
į		Firing	Amdl.	Redlant	Convection	Shut-Down	General	Net	Efflency	Usage	Savings	i S
			Se					盂	Increase	(MBTU/YR)	(MBTU/YR)	Savings (\$)
55	Onen Din Cons (Heclenda)	8.98		4.0%	2.0%	2.0%	4.0%	85.0%	17.1%	1064	214	\$1,685
<u>.</u>	Club (Bar)						-					
	Haclenda, Dwellings	•			•	•	•	•				
		26,50		20,7	2000	286	8	85.0%	12.0%	636.9	8	\$708
P 128	Officers Quarters Military	%5:55 5		5	K.U.2	20.3	2				٩	4200
S 197	Admin Bidg R&D - Office	94.0%	•	4.0%	2.0%	2.0%	1.0%	85.0%	16.0%	382.4	₹	2
	Admin Bida R&D - Electronics	•	•	•	•	•		•				
88	AAFES Spack Bar	94.0%		4.0%	2.0%	2.0%	1.0%	85.0%	23.8%	84.8	24	\$187
83 6	Welter Maint Show DS	19		4.0%	2.0%	2.0%	1.0%	85.0%	12.0%	900.5	127	\$66\$
8	Vence maint of the Co.	94.04		4.84	20%	2.0%	1.0%	85.0%	13.3%	403	63	\$498
8	Venice maint of the Cha	20.00		4 084	208	20%	1.0%	85.0%	11.1%	989.9	130	\$1,020
P 259	Venicle Maint Shop Und	200				200	ě.	96.70	24.2%	741 5	185	\$1.455
S 290	Electron Equip Facility	2 86.	•	\$5	80%	8 5 7	8	80.5	6.4:	?	!	
			,	•	•							
900	Cont Humid Warehouse	86.98	3.0%	4.0%	2.0%	2.0%	1.0%	85.0%	25.2%	375.2	111	\$874
2000	En Berrecke w/o Dining	9.09.		4.0%	2.0%	2.0%	1.0%	85.0%	25.3%	1014.5	305	\$2,380
3 5	Detached Lating/Shower	26.0		90.0	0.02	2.0%	1.0%	85.0%	25.9%	116.7	107	\$843
r g							Totals of Suc	Totals of Succesfull Repacements	ments		916	\$7,206

	•			
<u>ġ</u>	Installation Name			
		2	Capttol	
		Savinge (\$)	Coet (\$)	SB
P 101	Open Din Cons (Hacienda)	\$23,854	\$6,941	3.4
	Club (Ber)			
	Hacienda, Dwellings			
P 128	Officers Quarters Military	\$10,020	\$10.217	9
S 197	Admin Bldg R&D - Office	\$5,493	\$6.364	ē
	Admin Bidg R&D - Electronics	•		;
P 209	AAFES Snack Bar	\$2.650	\$6.364	70
P 252	Vehicle Maint Shop DS	\$14,128	\$12.557	
P 256	Vehicle Maint Shop ORG	\$7.045	198.82	-
P 259	Vehicle Maint Shop ORG	\$14.449	\$12,557	1.5
S 280	Electron Equip Facility	\$20,609	\$15,793	1.3
,000				
183	Cont Humid Warehouse	\$12,380	\$15,795	9.0
882	Eni Barracks w/o Dining	\$33,695	\$36,188	0.9
P 642	Detached Latrine/Shower	\$11,934	\$5,327	2.2
		\$102,039	\$69,756	1.5

CONSTRUCTION COST ESTIN	MATE			Date Prepared February	1993	Sheet Of	7 /
Project				Project No.	Basis for Est	timate	
EEAP Limited Energy Study					0.4.4.	- 4	n
Fort Hunter-Liggett, California					Code A (n	o design competed	1)
Engineer-Architect Keller & Gannon							
Drawing No.		Estirnato	7		Checked By		
ECO B-21, REPLACE BOILERS, BLDG 101							
Line Item	No. Units	Unit Meas.	Per Unit	abor Total	Per Unit	Total	Total Cost
Demolish existing boiler	1	EA	\$750	\$750		\$0	\$750
Demonstrexisting boner	<u>.</u>	<u> </u>	47.00	7,55		¥	4.00
Provide & Install 300,000 btuh boiler	1	EA	\$1,050	\$1,050	\$2,650	\$2,650	\$3,700
			<u> </u>				
							·
							···
		-					
Subtotal							\$4,450
Sales Tax @ 8%							\$356
Subtotal							\$4,806
Contractor OH & Profit @ 30%							\$1,442
Subtotal							\$6,248
Bond @ 1%							\$62
Subtotal							\$6,310
Estimating Contingency @ 10%							\$631
Total Probable Construction Cost							\$6,941

CONSTRUCTION COST EST				Date Prepared	1000	Sheet Of	7 <i> </i>
CONSTRUCTION COST EST	IMATE			February Project No.	Basis for Est		
EEAP Limited Energy Study				Project No.		mate o design competed	n
Fort Hunter-Liggett, California		<u></u>			COLUNI	o design competer.	'
Keller & Gannon Drawing No.		TE &			Checked By		
ECO B-21, REPLACE BOILERS, BLDG 1	28	Estimato	*		Checked by		
Line Item		untity Unit	Per	abor	Mat Per	erial	Total
Lille (text)	Units	Meas.	Unit	Total	Unit	Total	Cost
Demolish suisking baile		F4	6050	6050		40	* 050
Demolish existing boiler	1	EA	\$850	\$850		\$0	\$850
Provide & Install 570,000 btuh boiler	1	EA	\$1,400	\$1,400	\$4,300	\$4,300	\$5,700
	-						
	+	<u> </u>					
							
- P. W							
17 17 17 17 17 17 17 17 17 17 17 17 17 1							
	+ 1						
	+						
	1						
	1 1						
Subtotal							\$6,550
Sales Tax @ 8%	1						\$524
Subtotal Cut & D. Ci C 2007							\$7,074
Contractor OH & Profit @ 30%	1 1						\$2,122
Subtotal Bond @ 1%	1 1						\$9,196
Subtotal	+ +						\$92 \$9,288
Estimating Contingency @ 10%	1						\$9,288
Total Probable Construction Cost	1 1						\$10,217
	1 1						Ψ. U, E 17
					1	<u></u>	

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CONSTRUCTION COST ESTIN	/ATE			Date Prepared February	1993	Sheet Of	2-1
	MAIL			Project No.	Basis for Esti	mate	
Project FEAR Limited Energy Study				i rojectivo.			
EEAP Limited Energy Study				<u> </u>	Code A (no	design competed)
Fort Hunter-Liggett, California Engineer-Architect							
Keller & Gannon							
Drawing No.		Estimator			Checked By		
ECO B-21, REPLACE BOILERS, BLDG 197	7	ntity		abor	Mat	erial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Demolish existing boiler	1	EA	\$750	\$750		\$0	\$750
Provide & Install 264,000 btuh boiler	1	EA	\$930	\$930	\$2,400	\$2,400	\$3,330
	-	 					
	$\vdash \vdash$			L			
							
		1					
		-		<u> </u>		 	
		1					
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		ļ					
					ļ		
				ļ		<u> </u>	
Subtotal					<u> </u>		\$4,080
Sales Tax @ 8%					ļ		\$326
Subtotal					<u> </u>		\$4,406
Contractor OH & Profit @ 30%							\$1,322
Subtotal				<u> </u>			\$5,728
Bond @ 1%							\$57
Subtotal							\$5,786
Estimating Contingency @ 10%							\$579
Total Probable Construction Cost							\$6,364

				Date Prepared		Sheet Of	. 1
CONSTRUCTION COST EST	IMATE			February	1993 Basis for Esti	8 2	<i>1</i>
Project EEAP Limited Energy Study				Project No.			
Fort Hunter-Liggett, California					Code A (no	design competed)	1
Engineer-Architect							
Keller & Gannon Drawing No.		Estimator			Checked By		
ECO B-21, REPLACE BOILERS, BLDG 2							
Line Item	No. Units	untity Unit Meas.	Per Unit	abor Total	Mate Per Unit	Total	Total Cost
Demolish existing boiler	1	EA	\$750	\$750		\$0	\$750
	<u>.</u>						
Provide & Install 280,000 btuh boiler	1	EA	\$930	\$930	\$2,400	\$2,400	\$3,330
	_						
				<u> </u>			
				<u> </u>			
	<u> </u>						
				 		-	
			-				
							.
	+						
	-						
	-					<u> </u>	
	_						
Subtotal							\$4,080
Sales Tax @ 8%							\$326
Subtotal							\$4,406
Contractor OH & Profit @ 30%							\$1,322
Subtotal							\$5,728
Bond @ 1%							\$57
Subtotal							\$5,786 \$5,786
Estimating Contingency @ 10% Total Probable Construction Cost	+						\$579 \$6.264
Total Probable Construction Cost							\$6,364

CONSTRUCTION COST EST	IMATE	-		Date Prepared February	1993	Sheet Of Z.	1
Project				Project No.	Basis for Estima	ate	
EEAP Limited Energy Study Location			· · · · · · · · · · · · · · · · · · ·	<u> </u>	Code A (no d	lesign competed)	
Fort Hunter-Liggett, California Engineer-Architect							
Keller & Gannon		T=			Checked By		
Drawing No.	50	Estimato	7		Criecked by		
ECO B-21, REPLACE BOILERS, BLDG 2	Qua	ntity		abor	Materi	aj	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
		-	\$4.000	¢1 000		\$0	\$1,000
Demolish existing oil boiler	1	EA	\$1,000	\$1,000		Ψ0	Ψ1,000
The state of the s	+ 1	EA	\$1,525	\$1,525	\$5,525	\$5,525	\$7,050
Provide & Install 650,000 btuh boiler	- - '	15	\$1,020	V., 020	40,020	- 40,020	.,.,
		 					
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		<u> </u>					
					<u> </u>		
		<u> </u>		<u> </u>			
		ļ	<u> </u>				4
Subtotal					ļ		\$8,050
Sales Tax @ 8%			ļ				\$644
Subtotal			<u> </u>				\$8,694
Contractor OH & Profit @ 30%					ļ <u>-</u>		\$2,608
Subtotal		ļ	ļ	ļ	<u> </u>		\$11,302
Bond @ 1%		<u> </u>	ļ	ļ			\$113
Subtotal .		 	ļ		 		\$11,415
Estimating Contingency @ 10%							\$1,142
Total Probable Construction Cost		<u> </u>					\$12,557

				Date Prepared		Sheet Of	
CONSTRUCTION COST ESTI	MATE		*	February	1993		21
Project				Project No.	Basis for Est	imate	
EEAP Limited Energy Study				<u> </u>	Code A (n	o design compete	d)
Fort Hunter-Liggett, California					-		
Keller & Gannon							
Drawing No.		Estimato			Checked By		
ECO B-21, REPLACE BOILERS, BLDG 25		intity	Ι Ε	abor	Mai	erial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Domalish evieting all baller	1	EA	\$750	\$750		\$0	¢750
Demolish existing oil boiler	 		\$750	\$750		Ψ0	\$750
Provide & Install 270,000 btuh boiler	1	EA	\$930	\$930	\$2,400	\$2,400	\$3,330
	-						
	-						
	1						
	1						
						-	
41-4	ļ						
-							
	-						
	}					-	
	 						
	+						
	 						
A STATE OF THE STA							
Subtotal	 						\$4,080
Sales Tax @ 8%							\$326
Subtotal	† †						\$4,406
Contractor OH & Profit @ 30%							\$1,322
Subtotal			1				\$5,728
Bond @ 1%							\$57
Subtotal							\$5,786
Estimating Contingency @ 10%							\$579
Total Probable Construction Cost							\$6,364

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CONSTRUCTION COST ESTIN	/ATE			Date Prepared February	1993	Sheet Of	 Z.J
				Project No.	Basis for Estim	ate	
Project EEAP Limited Energy Study				,			
Location					Code A (no d	design competed)	
Fort Hunter-Liggett, California							
Keller & Gannon							
Drawing No.		Estimato	NT .		Checked By		
ECO B-21, REPLACE BOILERS, BLDG 259	9 I ():-	entity	 .	abor	Mater	ial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
		<u> </u>					
Demolish existing oil boiler	1	EA	\$1,000	\$1,000		\$0	\$1,000
			<u> </u>				
Provide & Install 650,000 btuh boiler	1	EA	\$1,525	\$1,525	\$5,525	\$5,525	\$7,050
-							
		-					
							•
		_					
							
							\$0 0E0
Subtotal							\$8,050 \$644
Sales Tax @ 8%							
Subtotal							\$8,694
Contractor OH & Profit @ 30%		ļ					\$2,608
Subtotal		<u> </u>					\$11,302
Bond @ 1%							\$113
Subtotal							\$11,415
Estimating Contingency @ 10%							\$1,142
Total Probable Construction Cost							\$12,557

CONSTRUCTION COST EST	IMATE			Date Prepared February	1993	Sheet 12 Of	Z1
Project			<u> </u>	Project No.	Basis for Est		
EEAP Limited Energy Study					Code A (n	o design compete	d)
Fort Hunter-Liggett, California						- assign sompore	Δ,
Keller & Gannon							
Drawing No. ECO B-21, REPLACE BOILERS, BLDG 2	90	Estimato	×		Checked By		
Line Item		untity	Per	abor	Mat Per	eriai	7-1-1
2.0	Units	Meas.	Unit	Total	Unit	Total	Total Cost
Demolish existing boiler	+ 1	EA	\$1,200	\$1,200		\$0	\$1,200
Committee Control	† <u> </u>		ψ1,200	Ψ1,200		40	\$1,200
Provide & Install 1,020,000 btuh boiler	1	EA	\$1,675	\$1,675	\$7,250	\$7,250	\$8,925
	 						
	+						· · · · · · · · · · · · · · · · · · ·
The state of the s							
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	1 1						
			<u> </u>			<u> </u>	
Subtotal							\$10,125
Sales Tax @ 8%							\$810
Subtotal							\$10,935
Contractor OH & Profit @ 30% Subtotal							\$3,281
Bond @ 1%							\$14,216 \$142
Subtotal	 	-+					\$14,358
Estimating Contingency @ 10%							\$1,436
Total Probable Construction Cost							\$15,793
	<u> </u>		<u>_</u>				

				Date Prepared	1000	Sheet /3 Of	71
CONSTRUCTION COST ESTIN	IAIE			February			
Project EEAP Limited Energy Study				Project No.	Basis for Est		
Fort Hunter-Liggett, California					Code A (n	o design compete	3)
Engineer-Architect							
Keller & Gannon		Estimato	r	<u> </u>	Checked By		
ECO B-21, REPLACE BOILERS, BLDG 291	1						
Line Item	Qua No.	ntity Unit	L. Per	abor	Per Mat	terial	Total
Zille terri	Units	Meas.	Unit	Total	Unit	Total	Cost
				4.000	ļ	-	#4 000
Demolish existing boiler	1	EA	\$1,200	\$1,200		\$0	\$1,200
		-	¢4 675	¢1 675	\$7,250	\$7,250	\$8,925
Provide & Install 1,020,000 btuh boiler	1_	EA	\$1,675	\$1,675	\$7,230	\$7,230	Ψ0,323
	-				<u> </u>		
	ļ						
·							
		<u> </u>					
							646 40-
Subtotal							\$10,125
Sales Tax @ 8%							\$810
Subtotal							\$10,935 \$3,281
Contractor OH & Profit @ 30%							\$14,216
Subtotal		ļ					\$14,216
Bond @ 1%							\$14,358
Subtotal							\$1,436
Estimating Contingency @ 10% Total Probable Construction Cost		 					\$15,793
Total Probable Construction Cost							Ψ10,700
<u></u>	L	<u> </u>	L	l]		

	-			Date Prepared		Sheet 14 Of	7,
CONSTRUCTION COST EST	IMATE		•	February	1993	17	<i>4</i>
Project EEAP Limited Energy Study				Project No.	Basis for Estim	ate	
Location Fort Hunter-Liggett, California					Code A (no d	design competed)	
Engineer-Architect					1		
Keller & Gannon Drawing No.		Estimato			Checked By		
ECO B-21, REPLACE BOILERS, BLDG 2	95	Csurieu	•		Criscina by		
	Qua	ntity		abor	Mater	a	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Demolish existing boiler	1	EA	\$1,500	\$1,500		\$0	\$1,500
Provide & Install 3,250,000 btuh boiler	1	EA	\$2,800	\$2,800	\$18,900	\$18,900	\$21,700
		 					
	+	<u> </u>					

	-						
	-						
Subtotal							\$23,200
Sales Tax @ 8%	_						\$1,856
Subtotal							\$25,056
Contractor OH & Profit @ 30% Subtotal	-						\$7,517 \$32,573
Subtotal Bond @ 1%							\$32,573 \$326
Subtotal							\$32,899
Estimating Contingency @ 10%	+						\$3,290
Total Probable Construction Cost							\$36,188

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CONSTRUCTION COST EST	IMATE			Pete Prepared February	1993	Sheet Of	۲1.
Project		•		Project No.	Basis for Estir	.1	•
EEAP Limited Energy Study							
Fort Hunter-Liggett, California				····	Code A (no	design competed)	
Engineer-Architect Keller & Gannon							
Drawing No.	· · · · · · · · · · · · · · · · · · ·	Estimato	r		Checked By		
ECO B-21, REPLACE BOILERS, BLDG 6]					
Line Item	Que No.	untity Unit	Per	abor I	Mater Per	rial	Total
	Units	Meas.	Unit	Total	Unit	Total	Cost
Demolish existing boiler		EA	\$750	\$750	·	\$0	\$750
Demonstr existing boiler	- '	LA	\$750	\$750		\$ 0	\$750
Provide & Install 180,000 btuh boiler	1	EA	\$840	\$840	\$1,825	\$1,825	\$2,665
				70.0	 	- 41,020	42,000
					-		
				-			
- 151 · · · · · · · · · · · · · · · · · ·							
	-						
	_						
	-						·
	1						
	1						
Subtotal							\$3,415
Sales Tax @ 8%							\$273
Subtotal							\$3,688
Contractor OH & Profit @ 30%							\$1,106
Subtotal	1						\$4,795
3ond @ 1%	\perp						\$48
Subtotal	11						\$4,843
stimating Contingency @ 10%	11						\$484
Total Probable Construction Cost	1						\$5,327
							, . –

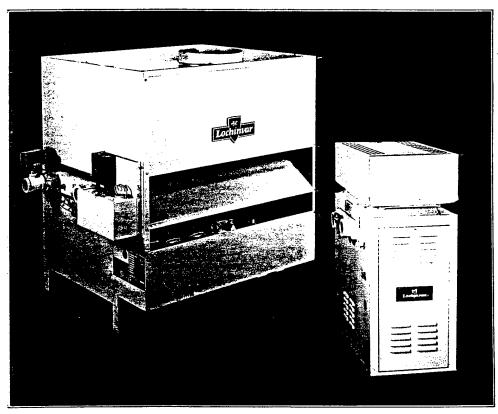
Life Cycle Cost Analysis Summary ECO C9 Energy Conservation Investment Program (ECIP) Sheet of Z/

	Fort Hunter Ligge Replace Low Efficient Fon Name: ECO# B	ency Boilers	Region No. 4			Project No. Fiscal Year	16-403-10 FY96
Analysis Date:		1-21	Economic Life:	15	YEARS	Preparer: K	ELLER & GANNON
Analysis Date	. Marci 1993		Economic Life.		ILAIO	r reparer. re	
1. Investment	Costs						
A. Construction	n Costs		\$69,756				
B. SIOH			\$3,837				
C. Design Cos	st		\$4,185				
D. Total Cost	(1A+1B+1C)		\$77,778				
E. Salvage Va	lue of Existing Equ	uipment			\$0		
	y Company Rebate	9			\$0		
G. Total inves	tment (1D-1E-1F)					\$77,77	'8
2. Energy Sav	ings (+)/Cost(-):			_			
Date of NISTIF	R 85-3273-X Used 1	for Discount Factors					
Energy	Cost	Saving	Annual \$		Discount	Discounted	1
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)	•
Cource	ψ,ιιτι Βο/() /	11127 (111(2)	outgo(o)			J	
A. Elec.	\$21.84	0.0	\$0		11.70	\$0	
B. Dist	\$4.98	0.0	\$0		13.78	\$0	
C. Propane	\$7.87	915.7	\$7,206		14.16	\$102,0	39
D. Demand	\$108.60	0.0 k	\$0		11.70	\$0	
E. Other				_			
F. Total			\$7,206			\$102,0	39
3. Non Energy	Savings (+) or Co	ost (-):					
A. Annual Rec	urring (±/-)		\$0				
	actor (Table A)			•	11.12		
• •	l Savings/Cost (3A	x 3A1)				\$0	
B. Non Recurr	ing Savings (+) or	Cost (-)					
Item	Savings(+)	Year of	Discount		Doscounted Sav-		
nem	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)		
a .							
b.							
C							
d. Total							
C Total Non E	nergy Discounted	Savings (3A2+3Bd4)			\$0		
4 Simple Paul	nack 1G//2E3±34	+(3Bd1/Economic Life	a))·		10.8	Years	
	scounted Savings		-//-		\$102,039	:	
	nvestment Ratio (S				1.31		

7. Adjusted Internal Rate of Return (AIRR):

170 21 ECO B-ZI

Copper-Fin® Boilers

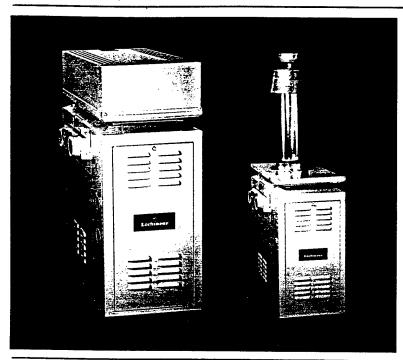




COPPER-FIN®—the energy efficient concept for today—and tomorrow!

- 22 models—capacities to 3,080,000 BTU—a size for every application
- Boiler design provides total protection from thermal shock
- Fin tube heat exchanger provides scale free performance
- Immediate response to heating demands
- Compact, lightweight construction
- A complete range of firing control and safety options
- Easily the most servicable Boiler on the market

Meets ASHRAE 90A-1980 Energy Efficiency Standards.



Standard Equipment

- Dial type temperature, pressure and altimeter gauge.
- Copper fin tubes.
- Atmospheric burners.
- Master on-off switch. Redundant gas valve.
- Adjustable high limit.
- ASME pressure relief valve- 30 PSI.
- Indoor or outdoor installation.
- 24 volt control system with transformer.
- Adjustable aquastat.
- Combination gas valve.
 Slideout burner tray.
- Completely enclosed controls.
- Thermocouple supervised pilot, 100% shut-off.

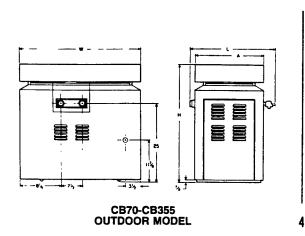
Optional Equipment

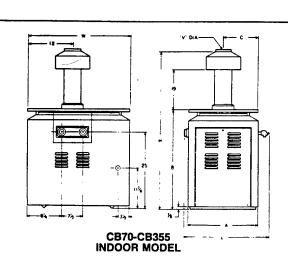
■ Intermittent pump controller ■ Cupro-nickel heat exchanger ■ Indoor/outdoor control ■ Low water cut-off Flow switch ■ Modusnap valve ■ High/low gas pressure safety switch ■ Alarm Bell—120V ■ Manual reset high limit ■ Module-Pak sequence firing ■ Thermometer

Model Number	BTU Input	BTU Output	Min. Pip e Size	Gas Conn. Size	"H" Height	"W" Width	"L" Length	"V" Vent	"A"	"B"	"C"	Weight
Indoor Mo	dels											
CB70	72,000	57,600	2"	1/2"	57³⁄8	28	17	4	12	323/8	6	185
CB110	108,000	86,400	2"	1/2"	581/4	28	19	5	14	32%	7	195
CB150	144,000	115,200	2"	1/2"	59	28	201/2	6	151/2	32%	73/4	210
CB215	216,000	172,800	2"	1/2"	60	28	24	7	19	32%	91/2	232
CB255	252,000	201,600	2"	3/4"	611/4	28	26	8	21	32%	101/2	251
CB355	355,000	284,000	2"	3/4"	611/2	28	32	9	27	32%	131/2	292
Outdoor M	lodels										.572	-72
CB70	72,000	57,600	2"	1/2"	39%	28	17		12			185
CB110	108,000	86,400	2"	1/2"	39%	28	19		14			195
CB150	144,000	115,200	2"	1/2"	39%	28	201/2		151/2			210
CB215	216,000	172,800	2"	1/2"	39%	28	24		19			232
CB255	252,000	201,600	2"	3/4"	39%	28	26		21			251
CB355	355,000	284.000	2"	3/4"	39%	28	32		27			292

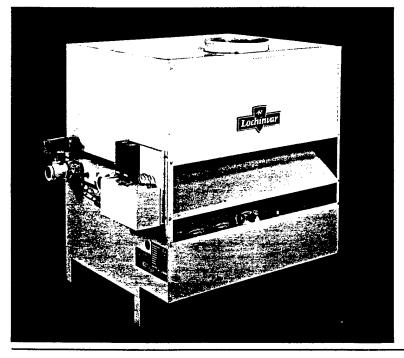
NOTES: 1. NOTE: LP gas models maintain full rated input—no derating required on these models.

2. Capacity ratings are actual heater performance at 80% combustion efficiency.









Standard Equipment

- Dial type temperature, pressure and altimeter gauge.
- Copper fin tubes.
- Atmospheric burners.
- Redundant gas valve.
- neouncam gas valve.
 Adjustable high limit.
 ASME pressure relief valve—50 PSI.
 Spark ignition. (CB475-CB3080)
 24 volt controls.
 Ruille in death disc.

- Built-in draft diverter.
- Off/On switch with indicator light.
- Removable burner tray.
- Enclosed control panel.
- Adjustable aquastat.
- Main gas pressure regulator and pilot regulator.
- Manually operated main gas cock and pilot gas cock.
- Low Water Cut-Off (probe type). (CB1540-CB3080) Module Firing—Standard on models CB1700 and above.
- Leak test gas cock. (CB1540-CB3080) Flow switch. (CB1540-CB3080)

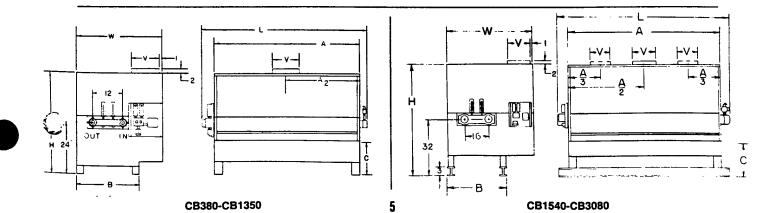
Optional Equipment

■ Intermittent pump controller ■ Cupro-nickel heat exchanger ■ Indoor/outdoor control ■ Low water cut-off ■ Flow switch ■ Modulating gas valve ■ High/low gas pressure safety switch ■ Alarm Bell—120V ■ Manual reset high limit ■ Module-Pak sequence firing ■ Additional solenoid gas valves ■ Motorized gas valve

■ Thermometer

	BTU Input	BTU Output	Gas				DIMENS	SIONS			Ship
MODEL	Natural Gas	Natural Gas	Conn. Size	V Vent	L † Length	W † Width	H H el ght	A	В	Gas Inlet	Wgt.
CB380	DISCONT	INUED		·	-						
CB475	475,000	380,000	1	10	43	351/2	47	351/2	261/2	14	692
CB570	570,000	456,000	4	12	48	351/2	47	401/2	261/2	14	756
CB665	665,000	532,000	1	12	53	351/2	47	451/2	261/2	.14	820
CB760	760,000	608,000	1	14	58	351/2	47	501/2	261/2	14	884
CB855	855,000	684,000	1	14	63	351/2	47	551/2	261/2	14	948
CB940	940,000	752,000	1	14	68	351/2	47	601/2	261/2	14	1012
CB1120	1,118,400	894,000	11/4	16	78	351/2	47	701/2	261/2	14	1180
CB1210	1,206,400	965,000	11/4	16	83	351/2	47	751/2	261/2	14	1238
CB1350	1,350,000	1,080,000	11/4	18	93	351/2	47	851/2	261/2	14	1300
CB1540	1,540,000	1,232,000	11/2	18	721/4	57	675/6	65%	351/2	11	1360
CB1700	1,694,000	1,355,200	2	20	771/2	57	67%	70%	351/2	11	1420
CB2000	2,002,000	1,601,600	2	20	88	57	67%	811/6	351/2	11	1660
CB2310	2,310,000	1,848,000	2	2-16	981/2	57	67%	91%	351/2	11	1900
CB2620	2,618,000	2,094,400	2	2-18	109	57	67%	1021/8	351/2	11	2140
CB3080	3,080,000	2,464,000	2	2-18	1243/4	57	67%	117%	351/2	11	2500

NOTES: 1. For L.P. gas models, reduce input and recovery 12%.



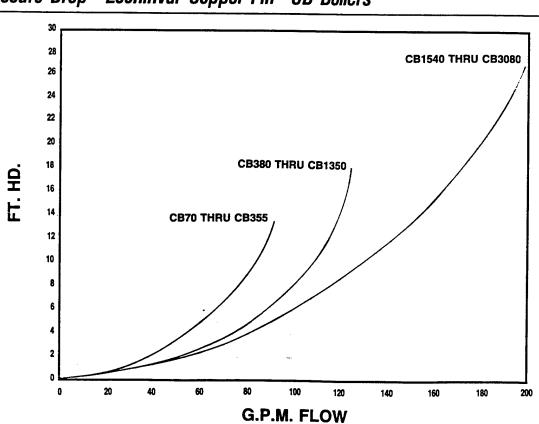
Temperature Rise Chart

Eco B-21

				0° 7T		TZ 20°		7T 00°		77 90°		ΔT :0°		0°
Model No.	Input	Output	GPM	FT.HD	GPM	FT. HD	GPM	FT. HD	GPM	FT. HD	GPM	FT. HD	GPM	FT. HD
CB-70	72,000	57,600	11.52	0.2	5.76	0.05								
CB-110	108,000	86,400	17.29	0.5	8.64	0.15	5.76	.045						
CB-150	144,000	115,000	23.05	0.8	11.52	0.2	7.68	.085	5.76	.05				
CB-180	180,000	144,000	28.81	1.2	14.41	0.29	9.60	0.14	7.20	.08				
CB-215	216,000	172,800	34.58	1.7	17.29	0.5	11.52	0.2	8.64	0.11				
CB-255	252,000	201,600	40.34	2.3	20.17	0.61	13.44	0.28	10.08	0.15				
CB-355	355,000	284,000	56.83*	4.9	28.41	1.2	18.94	0.55	14.21	0.3				
CB-380	DISCONTI	NUED												
CB-475	475,000	380,000	76	4	38	1.5	25	1						
CB-570	570,000	456,000	91	6	46	2	30	1	23	1				
CB-665	665,000	532,000	106*	6†	53	2.5	36	1.5	27	1				
CB-760	760,000	608,000	122*	6†	61	2.5	41	1.5	30	1	24	1		
CB-855	855,000	684,000	137*	6†	68	3	46	1.5	34	1	27	1	23	1
CB-940	940,000	752,000	151*	6†	75	4	50	2	38	1.5	30	1	25	<u> </u>
CB-1120	1,120,000	894,000	179*	6†	89	6	60	2.5	45	1.5	36	1,5	30	1
CB-1210	1,210,000	965,000	193*	6†	97*	8†	64	3	48	2	39	1.5	37	1
CB-1350	1,350,000	1,080,000	216*	6†	108*	10†	72	3.5	54	2	43	1.5	36	1.5
CB-1540	1,540,000	1,232,000	247*	11†	123*	11†	82	4	62	2.5	49	2	41	1.5
CB-1700	1,700,000	1,355,000	271*	11†	136*	11†	90	5	68	3	54	2	45	1.5
CB-2000	2,000,000	1,601,000	321*	11†	160°	11†	107	6.5	80	4	64	2.5	53	2
CB-2310	2,310,000	1,848,000	370*	11†	185*	11†	123	9	92	5	74	3	62	2.5
CB-2620	2,620,000	2,094,000	419*	11†	210*	11†	140°	11†	105	6.5	84	4	70	3
CB-3080	3.080,000	2,464,000	493*	11†	247*	11†	164°	11†	123	9	99	6	82	4

*FLOW RATE EXCEEDS RECOMMENDED FLOW RATES OF THE BOILER. IF THESE SYSTEM TEMPERATURE RISES ARE USED, AM EXTERNAL PIPING BY-PASS SHOULD BE INSTALLED AS SHOWN IN FIG. 1 (AT RIGHT). †FOOT HEAD CALCULATIONS FOR MAXIMUM ALLOWABLE FLOW RATE OF BOILER.

Pressure Drop—Lochinvar Copper-Fin® CB Boilers



ECO B-21

Typical Specification

BOILER—The hot water boiler shall be LOCHINVAR COPPER-FIN MODEL CB	having an input rating of
BTU/HR input andBTU/HR output,	J,

The water containing section shall be of the "fin-tube," 2 pass design, with straight solid copper tubes having extruded integral fins spaced 7 fins per inch. Tubes shall be securely rolled into glass-coated, cast iron headers with inspection coverplates removable from either end of the heat exchanger for purposes of inspection, cleaning, or repair. Heat exchanger shall be mounted on a stress-free steel framework (Models CB380-3080) in order to provide a "free-floating" design, able to withstand the effects of thermal shock. Heat exchanger shall carry a five year limited warranty against failure caused by defective workmanship or material.

The boiler shall bear the ASME "H" stamp and shall be National Board listed for 160# working pressure. The combustion chamber shall be enclosed by high temperature resistant, spall-proof refractory, which shall be modular for ease of replacement in sections. Boiler shall be constructed with a 16 gauge jacket, galvanized inside and outside, and protected with a 3 coat acrylic finish. Boilers CB380-3080 shall have a built-in draft diverter contained entirely within the jacket, and requiring no additional external drafthood devices. Models CB70-355 shall be available with either indoor or outdoor vent kits (specify). The boiler shall contain 3½ inches of high density fiberglass insulation.

Standard controls and equipment shall include: Copper fin tubes, atmospheric ribbon-type burners of aluminized steel, 100% safety pilot shutdown, control aquastat, electric hi-limit, redundant gas valves, manual gas cock, main and pilot gas pressure regulators, master switch, ASME pressure relief valve. Boiler shall meet the energy efficiency standards of ASHRAE 90A-1980. Boiler shall be A.G.A. or U.L. approved and listed.

The Firing Control System shall be______, (options below). Prefix "F" denotes standard on/off firing; prefix "M" denotes module firing.

F1 Standard equipment for Models CB70-CB380. Thermocouple supervision, standing pilot.

F9 Standard equipment for CB475 through CB1540. Electronic pilot supervision, spark ignition. 4 second main gas shutdown.

M9 Standard equipment on CB1700 through CB3080. Electronic pilot supervision, spark ignition. 4 second main gas shutdown.

F3/M3 FM approved system.

F4/M4 IRI (formerly FIA).

F5/M5 Illinois School Code.

F6/M6 Improved Risks Mutual (IRM).

F7/M7 California Code.

F9/M9 Includes spark ignition, electronic pilot supervision, 4 second main gas shutdown.

BURNER MODULATION (OPTIONS A & B)

- A) Boiler shall be module fired to effect peak fuel efficiency. Module firing shall employ dual gas controls, gas valves, and aquastats, with an overriding hi-limit safety control. With aquastat settings a few degrees apart, upon a call for heat, 50% of the boiler input will be fired. Where the demand cannot be met in this mode, the remaining 50% of boiler input shall be fired automatically to reach the full rated input of the boiler. Boiler shall be capable of 100% on/off firing.
- B) Boiler shall have a motor operated modulating gas valve capable of regulating the input rating of the boiler proportionate to the heating demand. Full modulation permits boiler operation from 100% of rated input down to approximately 20% of rated input, in order to effect greater boiler and system efficiency.

NOTE: Module firing systems are available with all firing control packages.



















COMPUTATION SHEET

Keller & Gannon

Engineers-Architects

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Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

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116 Exchange Service Station 140 140 140 140 140 140 140 140 150 <th< td=""><td></td><td>Hacienda, Dwellings</td><td>105</td><td>140</td><td>105</td><td>٠</td><td>37.89</td><td>•</td><td>\$0</td><td>\$298</td><td>0\$</td><td>\$4,222</td><td>\$69.57</td></th<>		Hacienda, Dwellings	105	140	105	٠	37.89	•	\$0	\$298	0\$	\$4,222	\$69.57
116 Exchange Service Station 105 <td></td> <td></td> <td>140</td> <td>140</td> <td>140</td> <td>•</td> <td>9.12</td> <td>-</td> <td>0\$</td> <td>\$72</td> <td>0\$</td> <td>\$1,017</td> <td>\$69.57</td>			140	140	140	•	9.12	-	0\$	\$72	0\$	\$1,017	\$69.57
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NA 105		Fire Station - Dorm	1	140	140	•	0.00	-	\$	0\$	0\$	0\$	\$69.57
		Fire Station - Garage	Ž		105	•	٠	•	\$	\$	0\$	0\$	

Fac		DHW Temperatu		res	ECO C1 Ene	ECO C1 Energy Savings						
Š	Installation Name	ECO C Actual	Actual	Authorized	Fuel Oil	Propane	Electric	FO Ann.	Prop. Ann.	Elec. Ann.	227	Investment
		Temp	Temp	Temp	Mil BTU/Yr	Mil BTU/Yr	MW-Hr/Yr	\$ Savings	\$ Savings	\$ Savings	Savings	
T 121	Bowling Center	105	121	105	•	10.68	•	\$0	\$84	\$	\$1,190	\$69.57
1.93	からか 最かなから	105	142	105	•	í	1.23	\$ 0	\$0	\$77	\$899	\$69.57
T 124	Family Housing LC & MJ	140	160	140	•	17.75	•	\$0	\$140	\$0	\$1,978	\$69.57
T 127	Officers Quarters Military	105	128	105	•	24.48	•	\$0	\$193	\$0	\$2,728	\$69.57
P 128	Officers Quarters Military	140	140	140	•	0.00	•	\$0	\$0	0\$	\$0	\$69.57
T 131	Family Housing CG & WO	140	135	140	-	(4.44)	•	\$0	(\$32)	\$0	(\$495)	\$69.57
S 144	Gymnaslum	NA	۸N	105	•	•	•	\$0	\$0	0\$	\$	•
S 146	FE Facility	Ν	•	105	1	1	•	\$0	0\$	0\$	\$	•
T 149	Family Housing NCO & Eni	135	135	140	-	0.00	•	\$0	\$0	\$0	\$0	\$69.57
T 156	FE Facility - Shop	105	140	105	-	-	0.34	0\$	0\$	\$21	\$245	\$69.57
	FE Facility - Office	Ϋ́		105	•	•	•	9	0\$	\$0	0\$	
r 158	Vehicle Storage	Y.	•	105	-	•	•	0\$	0\$	0\$	0\$	•
161	Admin General Purpose	NA	-	105	•	-	٠	0\$	0\$	0\$	0\$	•
T 162	Elec Maint. Shop	¥.	,	105	•	-	•	\$0	0\$	0\$	\$0	1
T 163	Officers Quarters Military	NA	•	105	•	-	•	0\$	0\$	0\$	\$0	1
164	Admin General Purpose	Ϋ́	•	105	•	-	•	0\$	0\$	0\$	\$0	•
165	Admin General Purpose	NA	•	105	-	-	•	0\$	0\$	0\$	0\$	•
166	Officers Quarters Military	Ϋ́	٠	105	•	•	•	0\$	0\$	\$0	\$0	
167	Officers Quarters Military	¥	•	105	•	8	•	0\$	0\$	\$0	0\$	٠
S 168	General Purp Warehouse	≨	•	105	1	•	-	\$0	0\$	\$0	\$0	•
T 172	Cold Storage Warehouse	₹	•	105	1	1	•	0\$	0\$	\$0	\$0	•
P 177	Technical Library	¥	•	105	8	•	•	0\$	0\$	0\$	\$0	•
P 178	Child Development Cntr	105	110	105	1	3.55	•	\$0	\$28	\$0	\$396	\$69.57
S 182	Commissary	105	110	105	1	•	0.32	0\$	0\$	\$20	\$231	\$69.57
3 186	Sup Svc Admin Bidg	0	•	105	•		•	0\$	0\$	0\$	\$0	
P 190	Post Chapel	105	125	105	•	ı	0.67	0\$	0\$	\$42	\$488	\$69.57
S 197	Admin Bidg R&D - Office	105	125	105	1	•	0.16	0\$	0\$	\$10	\$114	\$69.57
·	Admin Bidg R&D - Electronics	¥		105	1	•	•	0\$	0\$	\$0	\$0	•
S 198	General Inst Bidg	₹	'	105	1	•	-	0\$	0\$	\$0	0\$	١
P 205		105	1	105	10.49	•	•	\$52	\$0	\$0	\$720	\$69.57
P 205A		105	135	105	•	1	0.24	\$0	\$0	\$15	\$177	\$69.57
P 206	Enlisted Pers Dining Fac	6	1	140	0.00	1	•	\$0	\$0	\$0	\$0	\$69.57
	Kitchen Area - Scullery	140	<u>8</u>	140	•	•	-	\$0	0\$	\$0	\$0	•
P 207	Eni Barracks w/o Dining	- 59	145	105	203.31	•	•	\$1,012	0\$	\$0	\$13,952	\$69.57
P 207A	Company HQ Building	105	130 561	105	1	•	0.20	0\$	0\$	\$13	\$147	\$69.57
		105	5	105	198.10	•	1	286 \$	0\$	\$0	\$13,594	\$69.57
P 2084	Company HQ Bullding	105	140	105	<u> </u>	•	0.28	0\$	0\$	\$18	\$206	\$69.57

ECO C-1 Sheet 5of7

Fac		IDHW Temper	mperatures	80	ECO 03 Ex	South Contract						
Ž	Installation Name	1003		Authorizon		Eco of Lifeigy Savings	L					
-	-	Temp C	ξ F	Temp		Mil BTI I/V MAY U.V.		FO Ann.	Prop. Ann.	Elec. Ann.	227	Investment
P 209	AAFES Snack Bar	5	145	105			20 67	4 Savings	4 Savings	5 Savings	Savings	1000
P 210	Hith/Duti Clinic w/ Beds	140	140	140	5		23.07	Op (2	\$1,840	\$21,600	\$69.57
P 211	Outdoor Swimming Pool	2 2		100	30.0	•	•	\$0	0\$	\$0	O\$	\$69.57
0 242	Gymnaeliim	30,0	٥	2 5	•	•	•	20	\$0	\$0	\$0	1
000	Dhueloel Ethnoso Contor	3 5	200	202	•	£.63	-	\$0	\$36	\$0	\$516	\$69.57
200	En Derrecke w/e Distan	3	227	105	•	12.26	-	\$0	96\$	\$0	\$1,366	\$69.57
		3	130	105	44.14	•	•	\$220	0\$	\$0	\$3,029	\$69.57
	_	105	120	105	•	•	0.12	0\$	0\$	8\$	\$88	\$69.57
		8	123	105	122.38	•	•	609\$	0\$	\$	\$8,399	\$69.57
1 S	_	105	- - - - - - - - - - - - - - - - - - -	105	•	•	0.20	\$0	0\$	\$13	\$147	\$69.57
000	Admin General Purpose	≨		105	•	•	•	0\$	0\$	\$	0\$	1
0 0	Admin General Purpose	≨ :		105	•	•	•	0\$	0\$	0\$	9	•
1830	Admin General Purpose	≸	•	105	•	•	•	0\$	0\$	8	S	
0 250	Sig Photo Lab	105	72	105	•	2.93	٠	0\$	\$23	\$0	\$327	\$69.57
	Process	≨	160	•		21.55	•	0\$	\$170	0\$	\$2.401	\$69.57
240	Admin General Purpose	≨		105	•	•	•	0\$	\$0	0\$	0\$	•
5 241	GM Facility	- 3	120	105	1	•	0.29	\$0	0\$	\$18	\$208	\$69.57
		≨		•	-	•	•	\$0	\$0	\$0	O\$	•
		₹		•	•	•	٠	\$	\$0	\$0	0\$	
3243	Admin General Purpose	₹	·	105	1	•	•	\$0	0\$	\$0	0\$	
3244	Admin General Purpose	≨		105	•	-	٠	\$	\$0	\$0	0\$	-
0 240	Admin General Purpose	₹		105	•	•	٠	0\$	\$0	\$0	0\$	
5.247	Admin General Purpose	≨		105	•	•	•	\$	0\$	\$0	0\$	•
P 252	Venicle Maint Shop DS	5	22	105			0.66	\$0	\$	2	\$481	\$69.57
622	Vericie Mairit Shop OHG	- 195	135	105	•	•	0.39	0\$	\$0	\$25	\$287	\$69.57
200	Venicie Maint Shop UHG	105	125	105	٠	•	0.88	0\$	\$0	\$55	\$642	\$69.57
3		₹ :		105	•	•	•	\$0	\$0	\$0	\$0	•
286	Admin General Durages	≨ :	1	•		•	ı	\$0	\$0	\$0	\$0	٠
D 287	Recrestion Building	≨ Ę	• •	105	•	•		\$0	\$0	\$0		
000	Google Durane	3	- P	COL	•	19.57	•	\$0	\$154	\$0	\$2,181	\$69.57
200	Electron Equila Equilar	Ž	•	105	•		•	S	\$0	\$0	\$0	•
3	בוספיוסון בחתוף בשכווווא	2	2	105	•	9.15	•	\$0	\$72	0\$	\$1,020	\$69.57
2001	Sout Himid Westhone	¥:	1				•	\$0	\$0	\$0	\$0	·
2000	Coll. nulliid Wareflouse	Ž.	•	105	•	•	•	\$0	0\$	\$0	\$	٠
200	ADD Building	305	22	105	•	199.34	•	\$0	\$1,569	\$0	\$22,215	\$69.57
3		105	13%	105	1		0.62	\$0	\$0	\$38	\$450	\$69.57
	=	Ž		•			•	\$0	0\$	0\$	0 \$	•
		≨			,	•	•	0\$	0\$	9	0\$,
			· ·	***				F.	•	D		•

ECO C-1 Sheet 6 of 7

Fac	· · · · · · · · · · · · · · · · · · ·	DHW Temperatu	mperatur	res	ECO C1 Energy Savings	argy Savings						
Š	Installation Name	ECO C Actual	Actual	Authorized		Propane	Electric	FO Ann.	FO Ann. Prop. Ann. Elec. Ann.	Elec. Ann.	227	Investment
,	Sept. Sec. 1. Sec. 1.	Temp	Temp	Temp	Mil BTU/Yr	Mil BTU/Yr Mil BTU/Yr MW-Hr/Yr \$ Savings \$ Savings \$ Savings	MW-Hr/Yr	\$ Savings	\$ Savings	\$ Savings	Savings	
P 642	642 Detached Latrine/Shower	105	130	105	•	28.66	•	\$	\$226	0\$	\$3,194	\$69.57
S 2201	S 2201 Control Tower - Range SPT	ΑN	٠	105	•	•	1	\$0	0\$	0\$	\$0	•
Totals	who				8/9	430	83	\$2,881	\$3,388	\$3,632	\$130,157	\$5,009
								UPW x Invest =	9st ==	\$55,700	SIR =	会社的 13.3
4	のできるというというというというないのできるというないのできるというないのではないのできるというというというというというというというというというというというというというと	EHR	ath their	projekt or	-							

4

Life Cycle Cost Analysis Summary ECO C-1 Energy Conservation Investment Program (ECIP) Sheet 7 to 7

	Fort Hunter Lig Reduce DHW Te tion Name: ECO#	mperatures	Region No. 4		Project No. 16 Fiscal Year F	3-403-10 Y96
	te: March 1993	- O-1	Economic Life:	15 YEARS	Preparer: KELI	ER & GANNON *
·						
1. Investmer		<u></u>	\$5,009	_		
A. Construct B. SIOH	ion Costs		\$275	-		
C. Design C	net		\$301	-		÷.
	t (1A+1B+1C)		\$5,585	-		
	alue of Existing E	quipment	•	\$0		
F. Public Uti	lity Company Reb	ate		\$0		
G. Total Inve	estment (1D-1E-1F)			\$5,585	
0.5						
	avings (+)/Cost(-): TR 85-3273-X Use	d for Discount Facto	rs	-		
P	0	Ond-	Ammund &	Discount	Discounted	
Energy Source	Cost \$/MTBU/(1)	Saving MBTU/YR(2)	Annual \$ Savings(3)	Factor(4)	Savings(5)	
Source	Φ/M1DO/(1)	MID 10/11(2)	OEAN IGH(O)	1 2001(4)	Cavings(c)	
A. Elec.	\$18.23	199.2	\$3,632	11.70	\$42,496	
B. Dist	\$4.98	578	\$2,881	13.78	\$39,694	
C. Propane	\$7.87	430	\$3,388	14.16	\$47,968	
D. Demand	\$108.60	0.0	_k \$0==	11.70	\$0 3	
E. Other						
F. Total			\$9,900		\$130,157	*
3. Non Energ	gy Savings (+) or	Cost (-):		_		
A. Annual Re	ecurring (+/-)		(\$5,009)	_		
	Factor (Table A)			11.12	_	4584
(2) Discount	ed Savings/Cost (3A x 3A1)			(\$55,700)	
B. Non Recu	rring Savings (+)	or Cost (-)				
-						
Item	Savings(+)	Year of	Discount	Doscounted Sav		
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4) 	7
a. ·				•		
b. :			-		- ,*	
C.			-	****	-	
d. Total			*			
C Total Non	Energy Discounte	d Savings (3A2+3B	d4)	(\$55,700)		
4 Simple Pe	vh ack 1G//2F3±3	A+(3Bd1/Economic	: l ife)):	1.1	Years	2 (1) (2) (2) (2) (2) (2) (2) (2) (2) (2) (2
	Discounted Saving			\$74,457		
	Investment Ratio		*	13.33		1.00 miles
	nternal Rate of Re			87.56%		And the second s

COMPUTATION SHEET

Keller & Gannon

Engineers-Architects

COMPUTED BY JCS	Eco # cz	PROJECT_F		AP_
CHECKED BY	INSULATE DOMESTIC HOT	16-4	03 -10	
REV	WATER PIPES	SHEET NO.	OF	SHEETS
DESCRIPTION OF				
REDUCE ENER	ZGY CONSUMPTION BY THE INC	TALLATION	OF	
INSULATION ON	DOMESTIC HOT WATER PIPES.	Table 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
				or of makes make states a pulse acres
EVALUATION SUN	IMARY/APPROACH			
	WATER SYSTEMS FOR THE F	 10 04455"	OF ALT	1.78is
· - · · · · · · · · · · · · · · · · · ·	d into two types	راحان الحال		
	•			
I.) NON	- CIRCULATED			
2.) CIRC	WLATED.			
, Non Circul	LTED SYSTEMS			
	F MOST RESIDENCE - LIVING			
- · · · · · · · · · · · · · · · · · · ·	IES. HOT WATER FROM TH	4		
	TANK SITS, MOIDONLESS, IN T AUCET OR VALUE IS OPENED			
	ER LOSSES HEAT TO THE			
AIR AS CA	HARACTERIZED BY THE POL	LOWING		
EQUATION				
		<u> </u>		
- T(θ)=	To + (Ti-To)e GT	<u>vr</u>		
		+++++		
T = TEA	APERATURE AT TIME INCRE	ment o	4-1-1	
To = AMI	BIENT TEMPERANKE, ASSOM	D TO BE	55'F	112
T. WIT	AL TEMPERATURE, TAKEN -	O BE TH		
DHW.	HEATER SET POINT TEMPE	RATURE		
A = FLA	PSED TIME			
-				
$C_T = HEA^*$	r capacity of water I B	שי /ים		
UT > CONI	DUCTANCE OF PIPE AND	NSULATION	IE A	
	He. F			

FORM 101-1/8

COMPUTATION SHEET

Keller & Gannon

Engineers-Architects

COMPUTED BY JCS	ECO # C2	PROJECT FHL EEAP
CHECKED BY		16-403-01
DATE 19	INSULATE DOMESTIC HOT	
REV 19	WATER PIPES	SHEET NO OF SHEETS

NON-CIRCULATED SYSTEMS CONTINUED.

TEMPERATURE OF DHW STANDING IN PIPES

TO T= To+(Ti-To)e CHUT

BARE I"THICK
PIPE INSULATION

R4 BHU
hr. F

O TIME

TWO QUESTIONS ARISE: ! HOW LONG FOES IT TAKE THE WATER
IN THE PIPE TO COOL TO AN UNACCEPTABLE
LEVEL?

2.) DOES ADDING INSULATION AFFECT THIS TIME SIGNIFICANTLY?

BARE PIPE - TAMBIENT = 55 °F

HOW LONG POES IT TAKE 140°F WATER TO COOL TO BELOW 90%

$$\Theta = -\ln\left(\frac{35}{85}\right) \times \frac{1}{84} = 0.11 \text{ hrs} = 6.6 \text{ minutes}$$

INSULATED PIPE

$$\Theta = -\ln\left(\frac{35}{85}\right) \times \frac{1}{1.5} = 0.59 \text{ hrs} = 35 \text{ minutes}$$

THUS, IF THE WATER PEMAND IS NO MORE FREQUENT
THAN EVERY 1/2 HOUR, THEN INSULATION MAKES NO DIFFERENCE

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

DATE PERNARY 183 INSULATE DOMESTIC HOT WATER SYSTEMS HOT WATER CONTINUOUSLY CIRCULATES TURDICH THE PRING SYSTEM. THE WATER TEMPERATURE IS MAINTAINED AT OR NEAR THE WATER HEATER SET PAINT TEMPERATURE HEAT TRANSPER IS STEADY - STATE WHILKE MON-CIRCULATED SYSTEMS. SAMPLE CALCULATIONS FOR CIRCULATED SYSTEM HEAT LOSSES FOLLOW THIS NARRATIVE. THE FIELD INVESTIGATION VIELDED THE DESERVATION. THAT MOST PIPES HAD INSULATION AND ONLY SOME REQUIRED REFAIR. A SUMMARY OF EMERCY SAVINGS FOR BUILDINGS THAT PEROJIEED (IJSULATION REPAIR FOLLOWS THIS NARRATIVE. ORDER OF IMPLEMENTATION THIS WAS THE 2 ND ECO ASSUMED TO BE IMPLEMENTED.		COMPUTED BY	JCS	- <u> </u>	0 # C	.2	PROJECT #HL	<u>EEAP</u>
18 HOT WATER PIPES SHEFTNO_OF_SHEFTS 2. CIRCULATED HOT NATER SYSTEMS HOT WATER CONTINUOUSLY CIRCULATES THROUGH THE PIPING SYSTEM. THE WATER TEMPELATURE IS NAMITABLED AT OR NEAR THE WATER HEATER SET FRINT TEMPERATURE HEAT TRANSER IS STEADY - STATE MILIER HON - CIRCULATED SYSTEMS. SAMPLE CALCULATIONS FOR CIRCULATED SYSTEM HEAT LOSSES FOLLOW THIS NARRATIVE. THE FIELD INVESTIGATION VIELDED THE DESERVATION— THAT MOST PIPES HAD INSULATION AND ONLY SOME. REQUIRED REPAIR. A SUMMARY OF EMERGY SHINKS FOR BUILDINGS THAT PEONIZED INSULATION REPAIR FOLLOWS THIS NARRATIVE. ORDER OF IMPLEMENTATION THIS WAS THE 12 NO ECO ASSUMED TO BE IMPLEMENTED.		CHECKED BY_	BEVARY 19	93 INSUL	ATE D	OMESTIC	_	
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THROUGH THE PIPING SYSTEM. THE WATER TEMPERATURE IS MAINTAINED AT OR NEAR THE WATER HEATER SET FOINT TEMPERATURE HEAT TRANSFER IS STEADY - STATE UNLIKE MONI-CIRCULATED SYSTEMS. SAMPLE CALCULATIONS FOR CIRCULATED SYSTEM HEAT LOSSES FOLLON THIS NARRATIVE. THE FIELD INVESTIGATION VIELDED THE DESERVATIONS THAT MOST PIPES HAD INSULATION AND ONLY SOME REQUIRED REPAIR. A SUMMARY OF ENERGY SAVINGS FOR BUILDINGS THAT PEONIRED INSULATION REPAIR FOLLOWS THIS NARRATIVE. ORDER OF IMPLEMENTATION THIS WAS THE 12ND FOO ASSUMED TO BE IMPLEMENTED.		2	CIRCULA	IED HOI	VALLE	21216W2		
TEMPERATURE IS MAINTAINED AT OR NEAR THE NATER HEATER SET PAINT TEMPERATURE HEAT TRANSFER IS STEADY - STATE WILKE MON-CIRCULATED SYSTEMS. SAMPLE CALCULATIONS FOR CIRCULATED SYSTEM HEAT LOSSES FOLLOW THIS NARRATIVE. THE FIELD INVESTIGATION VIELDED THE DESERVATION THAT MOST PIPEL HAD INSULATION AND ONLY SOME PRODUIRED REFAIR. A SUMMARY OF EMBROY SAYINGS FOR BUILDINGS THAT PROVIDED INSULATION REPAIR FOLLOWS THIS NARRATIVE. ORDER OF IMPLEMENTATION THIS WAS THE 2 NO ECO ASSUMED TO BE IMPLEMENTED.			HOT WATE	ER CONTINU	OUSLY	CIRCULATE	÷\$	
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THE FIELD INVESTIGATION VIELDED THE DESERVATION THAT MOST PIPES HAD INSULATION AND ONLY SOME REQUIRED REPAIR. A SUMMARY OF ENERGY SAVINGS FOR BUILDINGS THAT RECOVERED INSULATION REPAIR FOLLOWS THIS NARRATIVE. ORDER OF IMPLEMENTATION THIS WAS THE 2 NE ECO ASSUMED TO BE IMPLEMENTED.						. ,		
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REQUIRED REPAIR. A SUMMARY OF ENERGY SAVINGS FOR BUILDINGS THAT REQUIRED INSULATION REPAIR FOLLOWS THIS NARRATIVE. ORDER OF IMPLEMENTATION THIS WAS THE 2 NO ECO ASSUMED TO BE IMPLEMENTED.			THE FIEL	D INVESTIGA	ALL MOLL	ELDED TH	e deservat	
A SUMMARY OF ENERGY SAVINGS FOR BUILD INGS THAT PEODIRED INSULATION REPAIR FOLLOWS THIS NARRATIVE ORDER OF IMPLEMENTATION THIS WAS THE 2 ND ECO ASSUMED TO BE IMPLEMENTED.			THAT MO	ST PIPES F	INSUI CLAN	LATION AND	ONLY SOME	
THAT PEONIED INSULATION REPAIR FOLLOWS THIS NARBATIVE. ORDER OF IMPLEMENTATION THIS WAS THE 2 ME ECO ASSUMED TO BE IMPLEMENTED.			REQUIRE	D REPAIR.				
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ORDER OF IMPLEMENTATION THIS WAS THE 2 ND ECO ASSUMED TO BE IMPLEMENTED.								
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THIS WAS THE 2 NO ECO ASSUMED TO BE IMPLEMENTED.			NARBATI	ve.				
THIS WAS THE 2 ME EZO ASSUMED TO BE IMPLEMENTED.		The contractor probability						
THIS WAS THE 12 ME EZO ASSUMED TO BE IMPLEMENTED.		- 020	DER OF 1	MPLEMENT	ATION			
IMPLEMENTED.								
IMPLEMENTED.			THIS WAS	THE OND	ECO A	SSUMED	TO BE	
								
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						· · · · · · · · · · · · · · · · · · ·		
(M 101-1/0	M 101 1/9							
	M 101-1/8							

ECO-C2 INSTALL PIPE INSULATION IN CIRCULATED HOT WATER SYSTEMS

Analysis of Circulated Domestic Hot Water Energy Savings

DHW Pipe Loss Pipe Loss Fuel Oil Fropane Federic Form FOAnn. Floor. Ann Elect. A	Fac	Baseline	92		# ODE	2 Finerow S	avinge					
Temp Mil BTU/Yr Mil BTU/Yr <th>Ş</th> <th>MHC C</th> <th>Pine oce</th> <th>0,00</th> <th></th> <th>O ARION</th> <th>2011122</th> <th></th> <th></th> <th></th> <th></th> <th></th>	Ş	MHC C	Pine oce	0,00		O ARION	2011122					
16mp Mill BTU/Yr Savings \$ Savings <th><u> </u></th> <th></th> <th>200</th> <th></th> <th></th> <th></th> <th></th> <th>FO Ann.</th> <th>Prop. Ann.</th> <th>Elect. Ann</th> <th>331</th> <th>nvestment</th>	<u> </u>		200					FO Ann.	Prop. Ann.	Elect. Ann	331	nvestment
105 10.8 10.8 - 0 - \$0 \$		Jemp	MII BTU/Yr	MI BTUY	MI BTUY	MII BTUM	MII BTLIM	Savinge	C Covince	e Confiden		
140 16.8 16.8 - 0 - 50 \$	120	105	α OF	900				SE III	o Cavillys	4 Cavillys	Savings	
140 16.8 16.8 0 \$0 <th< td=""><th>1</th><td></td><td>0.0</td><td>0.0</td><td></td><td>0</td><td>•</td><td>\$0</td><td>\$0</td><td>0\$</td><td>0\$</td><td>\$</td></th<>	1		0.0	0.0		0	•	\$0	\$0	0\$	0\$	\$
140 42.4 42.4 0 - \$0		145	16.8	16.8	٠	0		0\$	9	Ç.	9	Ç
140 74.0 74.0 0 - 50	205	140	42.4	42.4	c			Ş	3 2	\$	2	9
7 105 55.5 42.4 13.1 - \$65 \$0 \$65 \$6 \$7 \$7 \$7 \$6 \$7 \$6 \$7 \$6 \$7 \$6 \$7 \$6 \$7 \$6 \$7 \$6 \$7 \$6 \$7 \$6 \$7 \$6 \$7 \$6 \$7 \$6 \$7 \$6 \$7 \$6 \$7 \$6 \$7 \$6	200	140	77.0		ľ			3	9	O _P	\$ 0	₽
105 55.5 42.4 13.1 - \$65 \$0 \$89 \$89 105 56.5 53.0 2.5 - \$12 \$0 \$0 \$172 105 46.5 33.9 11.0 - \$55 \$0 \$755 105 45.9 34.9 11.0 - \$55 \$0 \$755 105 14.2 0.0 - 7.0 - \$0 \$55 \$0 \$780 105 14.2 0.0 - 7.9 - \$0 \$62 \$0 \$880 105 14.2 0.0 - 7.9 \$117 \$0 \$4.2241			2,4	74.0	2	•	٠	8	0\$	\$0	\$0	0\$
3 105 55.5 53.0 2.5 - \$12 \$0 \$172 105 46.5 35.5 11.0 - \$55 \$0 \$755 105 45.9 34.9 11.0 - \$55 \$0 \$755 105 19.3 0.0 7.0 - \$0 \$55 \$0 \$780 105 14.2 0.0 7.9 - \$0 \$62 \$0 \$880 105 14.2 0.0 7.9 7.9 . \$0 \$42.241	Ř	105	52.5	42.4	13.1	•		\$65	Ş	Ş	4000	200
105 46.5 35.5 11.0 - \$12 \$0 \$172 105 45.9 34.9 11.0 - \$55 \$0 \$755 105 45.9 34.9 11.0 - \$55 \$0 \$755 105 19.3 0.0 - 7.0 - \$0 \$55 \$0 \$780 105 14.2 0.0 - 7.9 - \$0 \$62 \$0 \$880 (otals 37.6 14.9 - \$117 \$0 \$4.2241	8000	105	55.5	53.0	36					3	600	3
105 45.9 34.9 11.0 - \$55 \$0 \$755 105 45.9 34.9 11.0 - \$55 \$0 \$785 105 19.3 0.0 - 7.0 - \$0 \$55 \$0 \$780 105 14.2 0.0 - 7.9 - \$0 \$880 \$880 105 14.2 0.0 - 14.9 \$117 \$0 \$4.241	220	100			6.3			\$12	\$0	80	\$172	\$100
105 45.9 34.9 11.0 - \$65 \$0 \$0 \$755 \$ 105 19.3 0.0 - 7.0 - \$0 \$55 \$0 \$775 \$ 105 14.2 0.0 - 7.9 - \$0 \$62 \$0 \$880 \$ Otals 37.6 14.9 - \$187 \$117 \$0 \$42241 \$	3	3	40.5	35.5	0.1		•	\$55	O\$	Ş	\$75E	100
105 19.3 0.0 - 7.0 - \$0 \$55 \$0 \$780 10.0 - 7.0 - \$0 \$62 \$0 \$780 10.0 - 7.0 - \$0 \$62 \$0 \$780 10.0 - 7.0 - \$0 \$62 \$0 \$780 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10	ල දි	105	45.9	34.9	-			455	2	3	201	200
105 14.2 0.0 - 7.9 - \$0 \$55 \$0 \$780	238	405	40.5	3				000	Ç,	9	\$755	\$100
290 105 14.2 0.0 - 7.9 - \$0 \$62 \$0 \$880			3.0	0.0	•	7.0	•	80	\$55	\$0	\$780	98
37.6 14.9 - \$187 \$117 \$0 \$4.241 \$	8	105	14.2	0.0		7.9		0\$	693	Ş	Vaas	004
37.6 14.9 - \$187 \$117 \$0 \$4.241										3	2000	200
37.6 14.9 - \$187 \$117 SD \$4.241	1											
	.		· · · · · · · · · · · · · · · · · · ·	Otals	37.6	14.9	•	\$187	\$117	0\$	\$4 241	\$520

CONSTRUCTION COST ES	TIMAT	ſΕ		Pebruary	1993	Sheet Of	
Project				Project No.		Estimate	
EEAP Limited Energy Study							
Fort Hunter-Liggett, California					Code A	(no design compe	etad)
Engineer-Architect					l		
Keller & Gannon Drawing No.		Estimato	×	·	Checked	By	
ECO-C2 Install Pipe Insulation					1	•	
		antity	B	Labor		Material	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Dide COT E/a insul for Oll pins	1		**	000	-	040	
Bldg. 207, F/g insul. for 2" pipe	10	LF	\$6	\$60	\$4	\$40	\$100
Bldg. 208, F/g inusl. for 2" pipe	10	LF	\$6	\$60	\$4	\$40	\$100
January Company of the Company of th			40	1		7.0	\$100
Bldg. 229, F/g insul. for 2" pipe	10	LF	\$6	\$60	\$4	\$40	\$100
Bldg. 230, F/g insul. for 2" pipe	10	LF	\$6	\$60	\$4	\$40	\$100
Bldg. 238, F/g insul. for 1" pipe	10	LF	\$4	\$40	\$2	\$20	\$60
Stage Stage	1		<u> </u>	4.0		V20	+00
Bldg. 290, F/g insul. for 1" pipe	10	LF	\$4	\$40	\$2	\$20	\$60
	1						
	-						*
Subtotal	+						\$520
Sales Tax @ 8%							\$42
Subtotal							\$562
Contractor OH & Profit @ 30%							\$168
Subtotal	 						\$730
Bond @ 1%							\$7
Subtotal	 	\longrightarrow					\$737
Estimating Contingency @ 10%						<u> </u>	\$74
Total Probable Construction Cost	 						\$811

......

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

Location: Project Title	: ECO-C2 INSTA	ggett, California ALL PIPE INSULATIO			Project No. 16-403-10 Fiscal Year FY96
Discrete Po		Bidgs. 127, 197	7, 212, 240 & 301		
Analysis Da	te: March 1993		Economic Life:	15 YEARS	Preparer: KELLER & GANNON
4 1					
1. Investme			0044	-	
A. Construc	tion Costs		\$811	•	
B. SIOH	\•		\$45	-	
C. Design C			\$0	•	
	st (1A+1B+1C)		\$856	4-	
	Value of Existing E			\$0 -	
	ility Company Reb			\$0	
G. Total Inve	estment (1D-1E-1F	-)			\$856
0 Energy 0					
	avings (+)/Cost(-)	: ed for Discount Fact		-	
Date of Mis	11H 05-32/3-X USE	a for Discount Pact	ors		
Energy	Cost	Saving	Annual \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
000.00	4/11/20/(1)	AIDTO, MILE)	Odiniga(O)	1 40401(4)	Cathigs(5)
A. Elec.	\$18.23	0 :	\$0.#	11.70	\$0 ©
B. Dist	\$4.98	48	\$240	13.78	\$3,308
C. Propane	\$7.87	15	\$ 117	14.16	\$1,660
D. Other	NA-	0	- \$ 0₽	NA	NA &
E. Demand			- \$0 3	11.70	- \$0 #
F. Total	g -	83 ≩	\$357		\$4,968
			*		4.,035
3. Non Enem	gy Savings (+) or	Cost (-):			
	<u> </u>				
A. Annual Re	curring (+/-)		\$0≉		
	Factor (Table A)			11.12	
(2) Discount	ed Savings/Cost (3A x 3A1)	•		\$0.2
		1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	*** **		
B. Non Recu	rring Savings (+)	or Cost (-)	•		
		4 - 2 Car			
ltem	Savings(+)	Year of	Discount	Doscounted Sav-	• ••
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4)	
8. 5	\$0 ₹	15 🖘	0.56.≅	\$07	
b. ≇	\$0 ≨	15 %	0.56 ≾	\$0 *	
C. "	\$0	15 -	0.56 %	\$0 -	
d. Total 🛎	\$0 .a	0	0.00	\$0 <u>~</u>	!
C Total Non	Energy Discounte	d Savings (3A2+3B	d4)	\$0 ≇	
			•	**	
4. Simple Pay	yback 1G/(2F3+3	A+(3Bd1/Economic	: Life)):	2.4	· Years
	Discounted Saving		••	\$4,968	•
	Investment Ratio			5.81	
	nternal Rate of Re		•	41%	

Keller & Gannon

COMPUTATION SHEET

Engi	neers-	Arol	-i+-	^+
⊏Hgi	neers.	-Arci	nte	CIS

COMPUTED BY JCS	ECO	# C3	PROJECT FHL EEAP
DATE FEBRUARY 1993	INSULATE	HOTWATER	10-403-10
REV 19	STORAGE	TANKS	SHEET NO OF SHEETS

DESCRIPTION OF WORK

REDUCE ENERGY CONSUMPTION BY INSULATING HOT WATER. STORAGE TANKS.

EVALUATION SUMMARY / APPROACH

HEAT LOSSES FROM HOT WATER TANKS WERE ESTIMATED USING GUIDANCE FROM "ARCHITECTS & ENGINEERS GUIDE TO ENERGY CONSERVATION IN EXISTING BUILDINGS," PUBLISHED BY THE US DEPT. OF ENERGY. THE GUIDE WAS USED TO ESTIMATE BASELINE AND REDUCED HEAT LOSSES. THE TWO WERE COMPARED TO PETERMINE ENERGY GAUINGS.

ORDER OF IMPLEMENTATION

THIS OPPORTUNITY WAS ASSUMED TO BE THE SELOND TO BE IMPLEMENTED

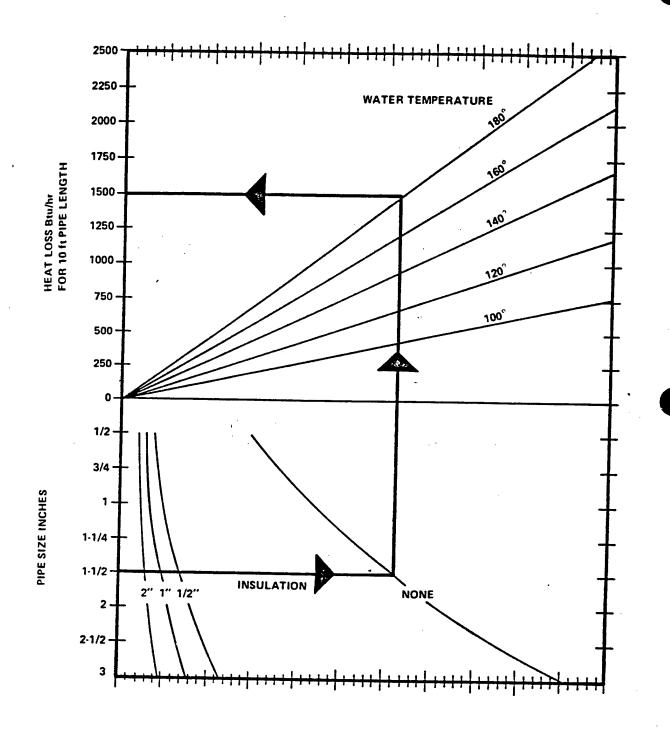


FIGURE 8-47. HEATING-HEAT LOSS FOR VARIOUS PIPE SIZES, INSULATION THICKNESS, AND WATER TEMPERATURES FROM 100°F TO 180°F

DOMESTIC HOT WATER TANK INSULATION LOSSES:

Insulation Thickness	Tank	IBTUH Losses at	Water Temper	reh mes				·	
(k = 0.3)	Gallons	100 Deg F	120 Deg F	122 Deg F	128 Deg F	135 Deg F	140 Deg F	160 Deg F	180 Deg F
[n = 0.0]	6	519	863	897	1,001	1,121	1,207	1,634	2,060
	20	768	1,277	1,327	1,480	1,658	1,785	2,407	3,028
	40	1,123	1,867	1,941	2,165	2,425	2,611	3,510	4,409
	50	1,301	2,163	2,249	2,507	2,809	3,024	4,062	5,100
	52	1,337	2.222	2,311	2,576	2,886	3,107	4,173	5,238
	69	1,639	2,724	2,833	3,158	3,538	3,809	5,111	6,413
Bare	80	1,834	3,049	3,170	3,534	3,959	4,263	5,718	7,172
Out	83	1,888	3,138	3,262	3,637	4,075	4,387	5,884	7,380
	100	2,190	3,640	3,784	4,219	4,727	5,089	6,822	8,554
	125	2,465	4,097	4,260	4,749	5,320	5,728	7,682	9,637
	250	3,840	6,382	6,636	7,398	8,288	8,923	11,987	15,051
	500	6,292	10,456	10,872	12,122	13,579	14,620	19,640	24,660
	850	9,725	16,160	16,804	18,735	20,987	22,596	30,354	38,113
	1,700	18,062	30,014	31,209	34,794	38,978	41,966	56,374	70,783
	6	83	129	134	147	164	175	223	270
	20	122	191	198	219	243	260	330	400
	40	178	280	290	320	356	381	483	585
	42	184	289	299	330	367	393	499	604
	50	206	324	335	371	412	441	560	678
	52	212	333	345	381	423	453	575	697
	69	259	408	422	467	519	556	705	854
1-inch Thick	80	290	456	473	522	581	622	789	956
	82	296	465	482	533	592	634	805	975
	100	346	545	564	624	693	743	943	1,142
	125	390	613	635	702	780	836	1,061	1,285
	250	607	955	990	1,094	1,216	1,303	1,653	2,002
	500	994	1,565	1,622	1,793	1,992	2,135	2,708	3,280
	850	1,536	2,418	2,506	2,771	3,079	3,300	4,185	5,069
	1,700	2,852	4,490	4,654	5,146	5,719	6,129	7,772	9,414
	50	109	173	179	198	220	236	299	362
2-inch Thick	100	184	291	301	333	370	397	503	609
	250	323	510	528	584	649	696	883	1,069
	500	528	834	865	956	1,064	1,140	1,446	1,751
	6	29	46	48	53	59	63	81	98
	15	40	63	65	73	81	86	110	133
	20	43	69	71	79	88	94	120	145
	40	64	101	105	116	129	138	175	212
	42	66	104	108	119	133	142	180	218
	50	74	117	121	134	149	160	203	245
	52	76	120	124	138	153	164	208	252
	69	93	148	153	169	188	202	255	308
3-inch Thick	80	105	166	172	190	211	226	286 ~	345
	83	108	171	177	196	217	233	294	355
	100	125	198	205	227	252	270	341	412
	125	141	222	230	255	283	304	384 -	464
	250	219	346	359 -	397	441	473	598 -	722
	500	359	567	588	650	723	775	980 ∻	1,184
	850	555	876	909	1,005	1,117	1,198	1,514	1,831
	1,075	681	1,075	1,115	1,233	1,370	1,470	1,857	2,247

Source: Architects and Engineers Guide to Energy Conservation in Existing Buildings, February 1980, U.S. DOE.

ECO # C3

Assumptions:

- Existing Hot Water Heater tanks that do not have insulation blankets are assumed to have the equivalent of 1-inch thick insulation.
- 2. Installation of an insulation jacket will provide the equivalent of 3-inch thick insulation.
- 3. Heat losses are in addition to those included in "Efficiency" calulation under "Convection Losses".
- 4. Unless controlled by time clock or othet means, losses are assumed to be continuous, 8,760 Hours per year.

DOMESTIC HOT WATER TANK INSULATION

		C HOT WATER	Existing Cor			- 1.1	1
Building Number	Tank	Existing	Tank Insttn		Proposed C		Heat Loss
	Gallons	Temp Deg F		Heat Loss	Tank Insttn	Heat Loss	Load Saved
6 ~	40		Inches	Mil BTU/Yr	inches	Mil BTU/Yr	Mil BTU/Yr
80	80	135	1	3.1	3	2.5	0.6
81	20 & 40	135	1	5.1	3	1.8	3.3
101	-	135	1	5.2	3	1.9	3.3
101.1	100	160	1	8.3	3	3.0	5.3
	40	140	1	3.3	3	1.2	2.1
101.2	83	140	1	5.6	3	2.0	3.6
120	100	110	. 1	3.9	3	1.4	2.5
120.1	100	140	. 1	6.5	3	2.4	4.1
124	40	160	1	4.2	3	1.5	2.7
127	100	128	1	5.5	3	2.0	3.5
131	40	135	1	3.1	3	1.1	2.0
144	69	Not used	1	0.0	3	0.0	0.0
149	40	135	1	3.1	3		1
197	6	128	· i	1.3	3	1.1	2.0
206	2 x 850	140	•	57.8		0.5	0.8
210	100	140	•		3	21.0	36.8
219	80	120		6.5	3	2.4	4.1
238	125	122	1	4.0	3	1.5	2.5
252	52	120	1	5.6	3	2.0	3.6
287	40		1	2.9	3	1.1	1.8
290		140	1	3.3	3	1.2	2.1
230	100	135	1	6.1	3	2.2	3.9

Assumptions:

- 1. Existing Hot Water Heater tanks that do not have insulation blankets are assumed to have the equivalent of 1-inch thick insulation.
- 2. Installation of an insulation jacket will provide the equivalent of 3-inch thick insulation.
- 3. Heat losses are in addition to those included in "Efficiency" calulation under "Convection Losses".
- 4. Unless controlled by time clock or other means, losses are assumed to be continuous, 8,760 Hours per year.

DOMESTIC HOT WATER TANK INSULATION

			Existing Cor	ndtion	Proposed C	ondtion	Heat Loss
Building Number	Tank	Existing	Tank insltn	Heat Loss	Tank insltn	Heat Loss	Load Saved
J	Gallons	Temp Deg F	Inches	Mil BTU/Yr	Inches	Mil BTU/Yr	Mil BTU/Yr
6	40	135	1	3.1	3	2.5	0.6
80	80	135	1	5.1	3	1.8	3.3
81	20 & 40	135	1	5.2	3	1.9	3.3
101	100	160	1	8.3	3	3.0	5.3
101.1	40	140	1	3.3	3	1.2	2.1
101.2	83	140	1	5.6	3	2.0	3.6
120	100	110	1	3.9	3	1.4	2.5
120.1	100	140	1	6.5	3	2.4	4.1
124	40	160	1	4.2	3	1.5	2.7
127	100	128	1	5.5	3	2.0	3.5
131	40	135	1	3.1	3	1.1	2.0
144	69	Not used	1	0.0	3	0.0	0.0
149	40	135	1	3.1	3	1.1	2.0
197	· 6	128	1	1.3	3	0.5	0.8
206	2 x 850	140	1	57.8	3	21.0	36.8
210	100	140	1	6.5	3	2.4	4.1
219	80	120	1	4.0	3	1.5	2.5
238	125	122	1	5.6	3	2.0	3.6
252	52	120	1	2.9	3	1.1	1.8
287	40	140	1	3.3	3	1.2	2.1
290	100	135	1	6.1	3	2.2	3.9

ECO-C3 INSULATE HOT WATER HEATERS

Fac	Existing	Existing Condition	ECO - C3	ECO - C3 Energy Savings	S						
Š	Tank Instru	Heat Loss	Tank Insitn	Fuel Oil	Propane	Electric	FO Ann.	Prop. Ann	Elec. Ann	227	Investment
	Inches	Mil BTU/Yr	Inches	Mil BTU/Yr	MII BTU/Y	MII BTU/Y	\$ Savings	\$ Savings	\$ Savings	Savings	
9.1	,	3.1	3	•	3.6		0\$	\$28	0\$	\$398	\$75
P 80	-	5.1	ဗ	ı	-	1.8	0\$	\$	\$33	\$384	\$75
P 81	-	5.2	ဗ	•	•	1.9	0\$	0\$	\$35	\$405	\$75
P 101	1	8.3	3	•	4.3	•	0\$	₹	\$	\$478	\$100
	_	3.3	င	•	1.7		0\$	\$13	\$0	\$191	\$75
	-	5.6	3	•	2.9		0\$	\$22	\$0	\$318	\$75
T 120	1	3.9	ဇ	•	1.9	•	0\$	\$15	\$0	\$207	\$100
2. 2.	-	6.5	ဗ	•	3.4	•	0\$	\$27	\$0	\$382	\$100
T 124	-	4.2	င	•	2.1	•	0\$	\$17	\$0	\$239	\$75
T 127	-	5.5	ဗ		2.9		0\$	\$22	\$0	\$318	\$100
T 131	-	3.1	3	•	1.6	•	0\$	\$12	\$0	\$175	\$15
S 144	1	0	•	-	١	•	0\$	0\$	0\$	0\$	0\$
T 149	1	3.1	3	-	1.6		0\$	\$12	\$0	\$175	92\$
S 197	-	1.3	င	•	•	9'0	0\$	0\$	6\$	\$107	\$75
P 206	-	57.8	3	24.2	•	•	\$120	O\$	\$0	\$1,660	\$1,560
P 210	1	6.5	ဥ	3.4	-	•	21\$	0\$	0\$	\$235	\$100
P 219	1	4.0	3	-	2.0		0\$	\$16	0\$	\$220	\$75
S 238	1	5.6	3	•	2.5	-	0\$	\$20	0\$	\$278	\$100
P 252	1	2.9	3	•	•	1.1	0\$	0\$	\$20	\$232	\$75
P 287	1	3.3	3	•	1.6	•	0\$	\$13	0\$	\$183	\$75
S 290	1	6.1	3	•	3.1	٠	\$0	\$25	\$0	\$348	\$100
			Totals	27.6	35.1	5.3	\$138	\$276	26\$	\$6,936	\$3,160

CONSTRUCTION COST EST	IMAT	F		Date Prepared Sheet Of February 1993			
Project				Project No.	Basis for	Estimate	
EEAP Limited Energy Study				Code A (no design competed)			
Fort Hunter-Liggett, California					Code A	(no design comp	sisu)
Engineer-Architect							
Keller & Gannon Drawing No.		Estimat	or		Checked	Ву	
ECO-C3 Insulate DHW Heaters							
Line Item	No.	antity Unit	Per	Labor	Per	/aterial	Total
Line tem	Units	Meas.	Unit	Total	Unit	Total	Cost
< 80 Gal. DHW Heater insulation kit	2	EA	\$24	\$48	\$13	\$25	\$75
		-	ΨΖΨ	Ψ-10	4.0	425	,,,,
fiberglass 1 1/2" Thick	 						
Typical for 13 others	11	-	-	-	-	-	\$825
> 80 Gal. DHW Heater	7	EA	\$65	\$455	\$35	\$245	\$700
850 Gal. Tank Insulated w/ 3" CaSil	2	EA	\$455	\$910	\$325	\$650	\$1,560
	ļ						
	 						
							·
	<u> </u>						
						<u> </u>	
	<u> </u>		ļ			<u> </u>	
	 						
	 						
	-		<u> </u>				
					· · · · · ·		
	1	†					
Subtotal							\$3,160
Sales Tax @ 8%							\$253
Subtotal						ļ	\$3,413
Contractor OH & Profit @ 30%	ļ						\$1,024
Subtotal	-						\$4,437
Bond @ 1%	<u> </u>	<u> </u>				 	\$44
Subtotal	<u> </u>		<u> </u>	ļ — — —			\$4,481 \$448
Estimating Contingency @ 10% Total Probable Construction Cost	 	1	 		 		\$4,929
TOTAL FIODADIE CONSTITUCTION COST	1	1	1	1	1		Ψ サ .フ <u>C</u> フ

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

Location: Project Title: Discrete Port Analysis Date		ett, California L TANK INSULATION	Region No. 4 Economic Life:	15	YEARS		16-403-10 FY96 ELLER & GANNON
1. Investmen			4- 1	_			
A. Constructi	on Costs		\$3,160	_			
B. SIOH			\$174	_			
C. Design Co			\$0				
	(1A+1B+1C)		\$3,334		**		
-	alue of Existing Equ	•			\$0 \$0		
	ty Company Rebat	е				 \$3, 3 3	4
G. Total inve	stment (1D-1E-1F)					ψ3,33	•
	vings (+)/Cost(-): IR 85-3273-X Used	for Discount Factors		-			
Energy	Cost	Saving	Annual \$		Discount	Discounted	
Source	\$/MTBU/(1) _.	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)	
A. Elec.	\$18.23	5	\$97		11.70	\$1,13	0
B. Dist	\$4.98	28	\$137		13.78	\$1,89	
C. Propane	\$7.87	35	\$275		14.16	\$3,90	
D. Other	NA	0	\$0		NA	. NA	
E. Demand S			\$0		11.70	\$0	
F. Total	J	68	\$510	•		\$6,92	5
3. Non Energ	y Savings (+) or C	ost (-):		-			
A. Annual Re	curring (±/-)		\$ 0				
	Factor (Table A)			-	11.12		
	d Savings/Cost (3/	A x 3A1)				\$0	
B. Non Recui	rring Savings (+) o	r Cost (-)					
item	Savings(+)	Year of	Discount		Doscounted Sav-		
ite.	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)		
	000.(7(.)						
a.	\$0	15	0.56		\$0		
b.	\$0	15	0.56		\$0	-	
C.	\$0	15	0.56		\$0	•	
d. Total	\$0	0	0.00		\$0		
C Total Non E	Energy Discounted	Savings (3A2+3Bd4))		\$ 0		
4 Simple Pay	/hack 1G//2F3±3A	+(3Bd1/Economic Li	fe))·		6.5	Years	
	iscounted Savings		·~//·		\$6,925	1 541 3	
	Investment Ratio (2.08		
	nternal Rate of Retu				13%		
,		vy-					

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY KS	ECO # C4	PROJECT FHL EBAP
DATE FEBRUARY 1993	ELECTRIC IGNITORS FOR	10 403-10
REV19	GAS HOT WATER HEATERS	SHEET NO OF SHEETS

DESCRIPTION OF WORK

REDUCE GAS CONSUMPTION BY ELIMINATING CONTINUOUSLY BURNING GAS PILOT LIGHT IN DOMESTIC HOT WATER HEATERS. INSTALL ELECTRIC PILOT INGUITORS TO FIRE WATER HEATERS.

EVALUATION SUMMARY / APPROACH

EVEN WELL INSULATED HOT WATER HEATERS HAVE HEAT LOSSES. CONTINUOUSLY BURNING GAS PILOT LIGHTS SERVE TO OFFSET TANK LOSSES, PREVENTING THE HEATER FROM CYCLING ON & OFF TO MAINTAIN THE WATER TEMPERATURE. ELECTRIC PILOT LIGHTS PROVIDE NO HEAT TO OFFSET TANK HEAT LOSSES, CANSING THE HEATER TOI CYCLE ON AND OFF TO MAINTAIN THE SET FOINT WATER TEMPERATURE. THE REDUCTION IN HEATER LIFE AS RESULT OF THIS CYCLING WOULD GREATLY OFFSET OR ELIMINATE ANY COST SAVINGS DUE TO REDUCED GAS CONSUMPTION.

THIS OPPORTUNITY SHOULD NOT BE IMPLEMENTED

ORDER OF IMPLEMENTATION

THIS OPPORTUNITY WAS ASSUMED NOT TO BE IMPLEMENTED.

COMPUTATION SHEET

Σ	Keller	&	Gannon
	Enginee	rs-	-Architects

COMPUTED BY	eco # C5	PROJECT FHL EEAP
CHECKED BY	REDUCE POMESTIC HOT	16-403-10
	WATER USE AT THE FAUCET	SHEET NO OF SHEETS

DESCRIPTION OF WORK

REDUCE HOT WATER USAGE BY THE INSTALLATION OF METERING OR SENSOR OPERATED LAVATORY FAUCETS AND SHOWER HEADS.

EVALUATION SUMMARY / APPROACH

HOT WATER CONSUMPTION CAN BE REDUCED BECAUSE FAUCETS CANNOT BE LEFT OPEN, RUNNING CONTINUOUSLY.

METERING FAUCETS ALLOW WATER FLOW FOR LIMITED PERIODS THEN THE VALVE CLOSES UNTIL THE LEVER IS DEPRESSED AGAIN.

SENSOR OPERATED LAVATORY FAKETS ONLY PERMIT WATER FLOW IF A SENSOR PERCEIVES A PERSON'S HANDS INSIDE THE LAVATORY BOWL.

ALTHOUGH CATALOG LITERATURE CLAIMS INSTALLATION OF SAID VALVES WOULD REDUCE WATER CONSUMPTION BY 80%, IT WAS MORE CONSERVATIVELY ASSUMED TO RESULT IN A 50% REDUCTION IN WATER CONSUMPTION.

THUS THE WATER SAVINGS WAS POUND BY:

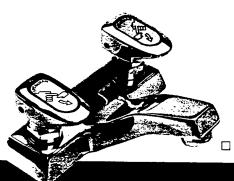
DHW USAGE CAN ALSO BE REDUCED BY THE INSTALLATION OF FLOW RESTRICTING SHOWER HEADS AND LAVATORY FAUCET INSERTS

ORDER OF IMPLEMENTATION

THE INSTALLATION OF FLOW RESTRICTORS WAS ASSUMED TO BE THE THIRD OPPORTUNITY IMPLEMENTED.

SPEAKMAN EASY-PUSH®





□ S-4141

Metering Lavatory 15mm to install Centerset **Combinations**

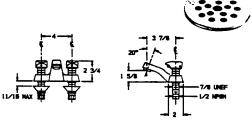
☐ S-4131

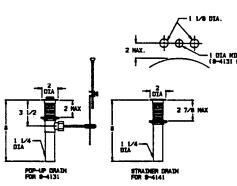
Speakman Polished Chrome Plated EASY-PUSH 4" Centerset Metering Lavatory Combination. Colorcoded EASY-PUSH handles with brass yokes. Concealed cycle adjustment without shutting off water supply. 1½" P.O. pop-up drain. Nonhammering operating units protected by monel mesh screens. Vandal-resistant standard. Water conserving, vandal-resistant flow control device reduces flow to a maximum of 3.0 gpm at 80 pounds flow pressure.

□ S-4141

Speakman Polished Chrome Plated EASY-PUSH 4" Centerset Metering Lavatory Combination. Color-coded EASY-PUSH handles with brass yokes. Concealed cycle adjustment without shutting off water supply. 11/4" P.O. strainer drain. Nonhammering operating units protected by monel mesh screens. Vandal-resistant standard. Water conserving, vandal-resistant flow control device reduces flow to a maximum of 3.0 gpm at 80 pounds flow pressure.

OPTIONS





SUFFIX	DESCRIPTION
□ BOCA/FLO	Vandal-Resistant 0.5 gpm Flow Regulator
□ BH	Brass Handles
□ LD	Less Drain Assembly
□ PALM	Palm Buttons (not handicapped approved)

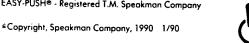




NOTE: Inlets are sized for either coupling or sweat connections. All directions and are subject to change without notice.

64 This space for Architect/Engineer approval.

EASY-PUSH® - Registered T.M. Speakman Company





The Quality Leader Since 1869 P.O. Box 191, Wilmington, DE 19899-0191 1-302/764-9100, FAX: 1-302/764-1956

3.0 gpm flow control device meets ANSI A112.18.1, 1989 Standard.

C5 ECO-O DOMESTIC HOT WATER SYSTEM SUMMARY

FLOW RESTRICTING SHOWER HEAD AND LAVATORY FAUCET RETROFIT

Non Lo-Flow Devices:

Lo-Flow Devices:

Shower Heads

5.00 gpm

2.00 gpm

Faucets

3.00 gpm

0.75 gpm

Function Code 1:

Offices

2.00 GPCD

Assume use from faucets 75% and by Janitor 25%.

Usage with Lo-Flow faucet aspirators:

1.10 GPCD

Function Code 2: Shops & Warehouses

5.00 GPCD

Assume use from faucets 50% of total usage.

Usage with Lo-Flow faucet aspirators:

3.50 GPCD

Function Code 2.1: Commercial Laundries - Not Applicable to this ECO.

Function Code 3: Barracks & Quarters w/o Dining

30.00 GPCD

		Lo-Flow
Usage	GPCD	GPCD
Showers	19.50	7.80
Faucets	4.50	1.13
Clothes Washing	6.00	6.00
Total	30.00	14.93

Function Code 3.1: Detatched Latrine with Bathing

25.00 GPCD

		Lo-Flow
Usage	GPCD	GPCD
Showers	19.50	7.80
Faucets	4.50	1.13
Clothes Washing	0.00	0.00
Total	24.00	8.93

Function Code 4: Barracks & Quarters with Dining

30.00 GPCD

Same as Function Code 3 for non-cooking hot water usage:

14.93 GPCD

Function Code 5: Recreation & Gyms w/o Bathing

0.50 GPCD

Assume use from faucets 50% of total usage.

Usage with Lo-Flow faucet aspirators:

0.35 GPCD

ECO-ST DOMESTIC HOT WATER SYSTEM SUMMARY

Function Code 5.1: Recreation & Gyms with Bathing

12.00 GPCD

		Lo-Flow
Usage	GPCD	GPCD
Showers	10.50	4.20
Faucets	1.50	0.38
Clothes Washing	0.00	0.00
Total	12.00	4.58

ECO - C5 Installation of Self-Metering Faucets

	Elect. Ann	\$ Savings	\$13	99\$	\$160	•	\$366		0000
	Electric	Mil BTU/Y	0.7	3.6	8.8	1	20.1		9 9 9
gy Savings	Propane	Mil BTU/Y	-	•	•	•	•		
ECO C5 Energy Savings	Fuel Oil	Mil BTU/Yr	•	•	•	•	•		
eating System	Capacity	BTUH	240,000	240,000	1,875,000	1,875,000	1,875,000		
				1			!	1	•
ot Water H	System	Temp.	110	125	130	0	132		
Domestic Hot Water Heating System	Fuel System	Used Temp.	Electric 110	Electric 125	Electric 130	None 0	Electric 132		

Electric
Mil BTU/Y
0.7
3.6
8.8
•
20.1
33.2

CONSTRUCTION COST ES	TIMAT	Έ		Pebruary 1993 Sheet Of				
Project EEAP Limited Energy Study	.,,,			Project No.	Basis for Estimate			
Location				Code A (no design competed)				
Fort Hunter-Liggett, California Engineer-Architect					-			
Keller & Gannon								
			Estimator			Checked By		
ECO-C5 Install Flow Metering Faucets		entity 1		Labor		faterial		
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost	
Self-Metering Lav. Faucets	15	EA	\$40	\$600	\$200	\$3,000	\$3,600	
1977WEFFEE 197								
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7 10 10	-							
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	+					-		
	+							
	1	-						
Subtotal							\$3,600	
Sales Tax @ 8%							\$288	
Subtotal							\$3,888	
Contractor OH & Profit @ 30%							\$1,166	
Subtotal					-		\$5,054	
3ond @ 1%							\$51	
Subtotal							\$5,105	
stimating Contingency @ 10%							\$510	
Total Probable Construction Cost					i		\$5,615	
							,	

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

Location: Project Title	Fort Hunter Lig ECO-C5 Self-m	gett, California netering faucets	Region No. 4		Project No. 16-403-10 Fiscal Year FY96
-	rtion Name:		, 212, 240 & 301		
Analysis Da	te: March 1993	_	Economic Life:	15 YEARS	Preparer: KELLER & GANNON
1. Investme				_	
A. Construc	tion Costs		\$5,615	-	
B. SIOH			\$309	_	
C. Design C			\$337	-	
	st (1A+1B+1C)		\$6,261	_	
E. Salvage \	Value of Existing E	quipment		\$0	_
	ility Company Reb			\$0	_
G. Total Inv	estment (1D-1E-1F	7)			\$6,261
2 Energy S	avings (+)/Cost(-)				
Date of NIS	TIR 85-3273-X Use	d for Discount Facto	ors	•	
Energy	Cost	Saving	Annual \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
A. Elec.	\$18.23	33	\$605	11.70	\$7,081
3. Dist	\$4.98	0	\$0	13.78	\$ 0
C. Propane	\$7.87	0	\$0	14.16	\$0
D. Other	NA	0	\$ 0	NA	, NA
E. Demand	Savings		\$0	11.70	\$0
F. Total		33	\$605	•	\$7,081
3. Non Ener	gy Savings (+) or	Cost (-):			
	ecurring (+/-)		\$0		
(1) Discount	Factor (Table A)			11.12	
(2) Discount	ted Savings/Cost (3A x 3A1)			\$0
3. Non Recu	urring Savings (+)	or Cost (-)			
tem	Savings(+)	Year of	Discount	Doscounted Sav-	
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4)	
1 .	\$0	15	0.56	\$0	·
) .	\$0	15	0.56	\$0	
) .	\$0	15	0.56	\$0	
i. Total	\$0		0.00	\$0	
Total Non	Energy Discounte	d Savings (3A2+3B	ld4)	\$0	
. Simple Pa	ayback 1G/(2F3+3	A+(3Bd1/Economic	c Life)):	10.3	Years
	Discounted Saving			\$7,081	
	o Investment Ratio			1.13	
_	internal Rate of Re	• •		5 04%	

5.04%

7. Adjusted Internal Rate of Return (AIRR):

ECO-C5 REDUCTION IN DOMESTIC HOT WATER CONSUMPTION

Analysis of the Effect of Installation of Flow Restricting Faucets/Shower Heads on Domestic Hot Water Energy Savings

Bldg.	Domestic I	1ot Water I	Domestic Hot Water Heating System
Š	Fuel	System	Capacity
	Osed	Temp.	ВТОН
127	Propane	110	240,000
197	Electric	125	1.25 kW

ECO C5 Energy Savings	rgy savings				
Propane	Electric	Prop. Ann	Prop. Anni Elect. Anni	33	Investment
Mil BTU/Yr	Mil BTU/Y \$ Savings \$ Savings	\$ Savings	\$ Savings	Savings	
2.1	•	\$17	-	\$239	\$135
•	12.8	٠	\$233	\$2,730	\$140
2.1	12.8	\$17	\$233	\$2,969	\$275

				Date Prepared		Sheet Of	
CONSTRUCTION COST EST	TAMI	Έ		February 1	February 1993		
Project EEAP Limited Energy Study				Project No. Basis for Estimate			
Location				Code A (no design competed)			
Fort Hunter-Liggett, California				i			
Keller & Gannon							
Drawing No.		Estimato	r		Checked	Ву	
ECO-C5 Install Flow Restrictors	T 011	antity		Labor	 ,	Material	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
						ļ	
Bldg. 127 Lavatory Flow Restrictors	1	LS	-	\$25	-	\$45	\$70
Bldg. 127 Shower Flow Restrictors	1	LS	•	\$25	-	\$40	\$65
				* 05		600	
Bldg. 197 Lavatory Flow Restrictors	1	LS	-	\$25	•	\$30	\$55
Bldg. 197 Shower Flow Restrictors	1	LS	-	\$25	•	\$60	\$85
Subtotal							\$275
Sales Tax @ 8%							\$22
Subtotal							\$297
Contractor OH & Profit @ 30%							\$89
Subtotal							\$386
Bond @ 1%							\$4
Subtotal							\$390
Estimating Contingency @ 10%							\$39
Total Probable Construction Cost							\$429

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

Location: Project Title: Discrete Port			Region No. 4		Project No. 16-403-10 Fiscal Year FY96
Analysis Date	e: March 1993	· ·	Economic Life:	15 YEARS	Preparer: KELLER & GANNON
1. Investmen			\$475		
B. SIOH			\$26		
C. Design Co			\$0		
	(1A+1B+1C)		\$501	•	
	alue of Existing Eq			\$0	_
	ty Company Rebat stment (1D-1E-1F)	9		\$0	\$501
G. Total Inves	sunent (10-12-17)				\$301
	vings (+)/Cost(-):				
Date of NIST	R 85-3273-X Used	for Discount Factors			
Energy	Cost	Saving	Annual \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
	•		4		
A. Elec. B. Dist	\$18.23 \$4.98	13	\$233 \$ 0	11.70 13.78	\$2,730 - \$0
C. Propane	\$7.87	2	\$0 \$17	14.16	- \$234
D. Other	NA NA	0	\$0	NA NA	- NA
E. Demand S			\$ 0	11.70	- \$ 0
F. Total		15	\$250		\$2,964
2 Non Enorg	v Savinge (+) of C	oot ():			
3. Non Energ	y Savings (+) or C	ost (-).	····		
A. Annual Re	curring (+/-)		\$0		
	Factor (Table A)			11.12	_
(2) Discounte	d Savings/Cost (3A	(x 3A1)			\$0
B. Non Recur	ring Savings (+) o	r Cost (-)			
item	Savings(+)	Year of	Discount	Doscounted Sav	
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4))
a.	\$0	15	0.56	\$ 0	
b.	\$0	15	0.56	\$0	•
C.	\$0	15	0.56	\$0	•
d. Total	\$0	0	0.00	\$0	•
C Total Non E	nergy Discounted	Savings (3A2+3Bd4)	\$0	
		+(3Bd1/Economic Li	fe)):	2.0	Years
	iscounted Savings			\$2,964	
	Investment Ratio (S			5.91	
r. Aajustea in	ternal Rate of Retu	m (AIHH):		49.75%	

Keller	&	Gannon
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UTED BY JCS	· #	
LITED BY	ECD # C6	PROJECT FHL EEAP
KED BY		- 1 16-A03-10
FEBRUARY 1993		SHEET NO OF SHEE
19	LAUNDERING	SHEET NO OF SHEE
		en en en en en en en en en en en en en e
DESCRIPTION OF	= WORK	
	and agree with the contract of	
reduce ener	164 CONSUMPTION BY USING	COLD WATER
INSTEAD OF H	ot at Laundry Machines.	
	المراجع المستقد المستق	
	· · · · · · · · · · · · · · · · · · ·	
EVALUATION SUM	MARY/APPEDACH	
		The second secon
on paper t	HIS ECO ALWAYS HAS	CONSIDERABLE
ENERGY SA	VING POTENTIAL WITHOUT	ot much initial
COST.	• • • • • • • • • • • • • • • • • • •	
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	T HAS BEEN KELLER AND	
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ORDER OF IMP	PLEMENTATION	
		F IMPLEMENTED
	PLEMENTATION WAS ASSUMED NOT 70 B	E IMPLEMENTED
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THIS ECO.	NAS_ASSUMED NOT 70 B	
THIS ECO.	NAS_ASSUMED_NOT_70_B	

Keller & Gannon

Engineers-Architects

COMPUTED BY BIF	/ EGO (7	PROJECT 16-403-10
CHECKED BY		FHL EEAP
DATE MARCH REV.	19— HEATER FOR CAN WASHE	OUTET NO DE 5 CHEETE
nLv.	- HEATER FOR CAN WASHE	
PGRE SUR	VEY OF 1982 SUGGESTE	D THE FOLLOWING
		The Sollowing is
18. Garbage can	washer booster.	copial from
Demand Reduc	tion = 58.5 kw (booster capacity)	•
	gs = 58.5 kw x 730 hrs/yr	PGRE'S Energy
Ducigy Duvin	= 42,705 kwh/yr	Audit Report.
Cost Savings	= 42,705 kwh/yr x \$0.0801/kwh = \$3,420.67/yr	
		•
Additional us	e of fuel oil = $42,705$ kwh/yr x $3,4$	13 BTU/kwh x $\frac{1}{.75 \text{ boiler eff.}}$ x
	gal/150,000 BTU	
	= 1,296 gal/yr	•
Additional Co	st = 1,296 gal/yr x \$1.20/gal = \$1,555.20/yr	
Net energy lo	ss at site; net energy gain at sour	ce of electricity
generation.		
Net Cost Savi	ngs = \$1,865.47/yr	
Estimated Cos	t = \$3,000 for heat exchanger and p	oiping installed
Simple Paybac	k = \$3,000 cost \$1,865.47/yr savings	
•	= 1 year 8 months	
· ·		
		No. 200
HOT WATER		

18. Garbage can	washer booster.	-
Recommend:		
2	washer at building #206 with one w	
	existing boiler at that building.	
<u>:</u>	cost of cleaning the cans while refor the base.	sancing the electric demand
<u> </u>	Tot the base,	
F		
		
<u> </u>		
	The second second second is a second to the second	

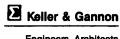
FORM 101-1/8

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY BIA	Edo C7	PROJECT_16-4-03-10
CHECKED BY	RESCACE ELEC, BOOSTER	FHL EEAP
REV19	HEATER FOR CAN WASHER	SHEET NO. 2 OF 5 SHEETS
_		
1993 EEAT RE	COMMENDATION:	
Disconnect e	hectric booster heater s	con was ber.
Interrupt 1	riping from booster	heater and
connect to	DHW supply.	
·	of DHW to wash	ions. Sanifrée
cons follow	ving was himp with	a solution
of house	hold bleach and	water.
	reventine Medicike"	
water/chlo	rine bloach mixture	requirements.)
- Emmen San	d=1-1-1-	
Energy Sau	ings Calculation	
Elactrici do una	IN SOURGE 58,5 KW	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1
Cost Savin	195 (non-peak demond char	9e\
The second of th	end Savings 58,5 KW igs (non-peak demond char \$40,80 x 58,5 kW	= 4 /42
****		The state of the s
- Erectric USE	Savings: 730 hours (verified po	of use per year
+80 * 57	3,5 kw 40.7 = 29,900K	.WH/YK
	- Edward L Cor	
	diversity for my Hiple	
COST S	avings e year - Round Ra	26-0550M05
	washing occurs in h	
The second secon	<u> </u>	
2	9900KWH ×40.06223/K	WH = B /gR.
Added No. 2	to Cost:	
730 × 58	5 × 0,7 +3413 /1000,000=	102 ×106 BN /42
Eztimato	1 HW B/r 17 = 70.8%	thermel load
<u> </u>		
	10,708 = 144 ×106 B	_
Added	Fuel Cost # 7.87/10681	V 144410 BTU
	_ 1 = 1	



			Engineers-Architects
COI	MPUTED BY BIH		PROJECT 16-403-10
	ECKED BY	200 [7	FHL BEAP
	T MARCH 1093 R	.BPLACE BLEC. BOOSTER	
	E <u>HAOCI+</u> 1993 R	SELECTION ASSESSMENT	QUEET NO Z OF 5 QUEETS
HEV	19 #	EATER FOR CAU WASHER	SHEET NO. 3 OF 3 SHEETS
-	SUMMARY EN	Savingstyr L	unit Cost Cost Saved
	ELECTRIC	DELIAND 58.5KW	\$40.80 \$2387
-	* * * * * *	USE 29,900 KWH	#0.06223 #1861
ĺ	FUSEL MIL	(124 MIBH)	# 7.87 \$(1133)
ļ	FUEL BIL	(477 1477 15.0)	
	FUEL OIL		#31/5/yr,
	weelest added	cost of bleach us	minimal compared
		cost of bleach as nest savings (less	Hum Himlur
İ	to energy w	St sacing (Leas	, 201, 21,001,71
-	No need for a	servial heat exchan	mer Cor high
	Laura lecatas	special heat exchange	ling is used
	remp. Water	Dievi Dieuch Solut	2077 13 USEC.
		graphic control of the control of th	
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CONSTRUCTION COST E	STIMAT	ΓE		DATE PREPARED FEBRUARY		SHEE	T 4 OF 5
PROJECT EEAP LIMITED ENERGY	STuo	~		PRJ. No. C7	l .	OR ESTIMATE ,] CODE A (No de	esign completed)
LOCATION FURT HUNTER LIGHET ARCHITECT ENGINEER	T, CAI	14.3 K	11A	- Bldg 206	c	ODE 8 (Prelimina)	ery design)
KELLER & GANNON				•	🗆 •	THER (Specify)	
DRAWING NO.		ESTIM	ATOR BIH			CHECKED BY	
Disconnect Booster	QUANT	ITY		LABOR		MATERIAL	TOTAL
Heater for Can Washer	NO. UNITS	UNIT MEAS,		TOTAL	PER UNIT	TOTAL	COST
Disconnect Electric	1	MH	40.1	40	10	10	50
DISCONNect Extg Plumb.		MH	41.5	41.5	-	-	42
Connection to Hr							
Install 3/4"CU Pipe	20	LF	4	80	3	60	140
from DHW to Can-							
Wash piping		-					
Insulate 3/4 CU Pipe	20	LF	2.4	48	1.4	28	76
•		-	<u> </u>		 		
·		 	ļ	<u> </u>	-	· · · · · · · · · · · · · · · · · · ·	
							-
· Sugges							200
SUBTOTAL SALES TAX E 8%		+	+-	-	+		308
SUBTOTAL	 		 	_	 -	-	333
CONTRACTOR OH & PROFIT @30%		1	-		-	-	100
SUBTOTAL			-	-	-	1	483
BOND @ 19.			-	-	1-		43
. SUBTOTAL			-	-	1-		437
ESTIMATING CONTILGENCY Q10%			_	-	-	_	44
TOTAL CONSTRUCTION LOST			-	-		_	481
PROBABLE	<u></u>		1		<u> </u>		

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

ECO C7 Sheet 5 of 5

1467.00%

	Fort Hunter Lig : Remove Electric	Booster Heater	Region No. 4		Project No. 16-403 Fiscal Year FY96	
	rtion Name: ECO# te: March 1993	C-7, Bldg 206	Economic Life:	15 YEARS	Preparer: KELLER	& GANNON
1. Investme	nt Costs					
A. Construc	tion Costs		\$481	-		
B. SIOH			\$26	- -		
C. Design C	ost		\$29	-		
	st (1A+1B+1C)		\$536	_		
	Value of Existing E			\$0.		
	lity Company Reb			\$0		
G. Total Inve	estment (1D-1E-1F	7)			\$536	
2. Energy S	avings (+)/Cost(-)			•		
Date of NIST	TIR 85-3273-X Use	d for Discount Facto	rs			
Energy	Cost	Saving	Annuai \$	Discount	Discounted	
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)	
A. Elec.	\$ 21.84	102.0	\$2,229	11.70	\$26,076	
B. Dist	\$4.98	(144.0)	- \$2,229 - (\$717)	13.78	\$26,076 (\$9,882)	
C. Propane	\$7.87	0.0	_ (\$/1/) _ \$ 0 ::	14.16	(\$\$,802) \$0 ::	
D. Demand	\$108.60		k \$6,353	11.70	\$74,331	
E. Other	4100.00		# # #			
F. Total			\$7,865		\$90,526	
3. Non Ener	gy Savings (+) or	Cost (-):				
A. Annual Re	ecurring (+/-)		\$0 ₹	•		
	Factor (Table A)			11.12		
	ed Savings/Cost (3A x 3A1)			<u>\$0</u> \$	
		•			·	. :
B. Non Recu	ırring Savings (+)	or Cost (-)				
						Tal.
item	Savings(+)	Year of	Discount	Doscounted		
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost	i(-)(4)	
8. ::						
b. 🖫			-			-
C.						
d. Total						- AV 5
C Total Non	Energy Discounte	d Savings (3A2+3B	14)	\$0		
4. Simple Pa	vback 1G/(2F3+3	A+(3Bd1/Economic	Life)):		0.1 Years	
	Discounted Saving		· · · · · · · · · · · · · · · · · ·	\$90,		
	Investment Ratio				8. 79	

7. Adjusted Internal Rate of Return (AIRR):

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY BIR	RECOVER HEAT FROM	PROJECT 16.403-10
DATE HANCH 1993	DINING FACILITY	
REV 19	DISHWASHING	SHEET NOOFSHEETS

DESCRIPTION OF ACTION

Install a commercial type package heat recovery unit at each dishwashing location in facility 206. The unit extracts waste heat from dishwasher discharge and uses it to preheat cold water make-up.

The Waste Energy Transfer System, Molitar Industries, Inc. 1 ecycles 70% to 75% of energy normally wasted.

FACILITYES INCLUDED

DINING FACILITY, BLDG 206

ENERGY SAUING CALCULATION

Refer to attached brochure for supporting Lata.

DIN to dishwasters is provided at 140 °F from bldg system, fuel oil final, average thermal efficiency 70.8 %. Of the total DHU heating fuel use of 406 Hil Brulyr, 50 % is assumed used in dishwasters.

Distinuasters heat DAW from the supply Loup. Is to 1800 F for sanitizing, discharge Lamp. is

75% Lest recovery is possible:

906×106×104×0.5 × 0.708 = 321 ×106 BTU/YR Thormal load for 75% recovery = 321×0.75 = 240×106 BTU/Yr dishwas hing.

Recovery.

Keller & Gannon

COMPUTATION SHEET

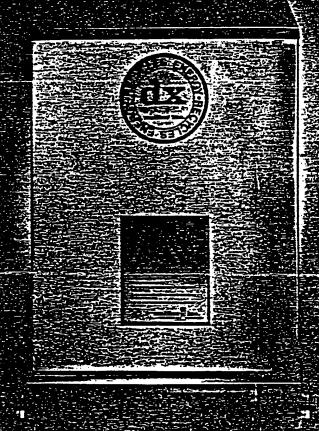
Engineers-Architects

COMPUTED BY BIH CHECKED BY BIH CHECKED BY BCO C-8 RECO C-8 RECO C-8 RECO C-8 RECO C-8 RECO C-8 RECO C-8 RECO C-8 RECO C-8 RECO C-8 RECO C-8 RECO C-8 RECO C-8	PROJECT 16 - 403 - 10 FILL EEAP SHEET NO. 2 OF 8 SHEETS
Recovered heat is sent to the	Deve) inchence
Recovered rules is seal to	DISCO MILICOF,
- Avoidéed use de Cual oil is:	
The state of the s	
240 40 BYO/Yr 129 106.	The Fire Du
0,708 = 339 ×106	siojy) ioecoje
0,70g	SAUED
\$4.98 × 339 × 10 Brigg = \$ 1688	
Allow 4 hrs/gear @ 40 \$/Hr for p. cleaning, etc.	naintenouse,
eleaning, etc.	
=\$160 /year.	
v	
-	
AND THE RESIDENCE OF THE PROPERTY OF THE PROPE	
- Tarana - Carana	
The state of the s	
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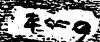
FORM 101-1/8

Some Millions of Bruss & Humohods of Dollors Amount of by

ECD CB Sheet3 of 8



The Molitor dx Wasie : Energy Transfer Sysiem



Wasie Energy Transfer Sysiem for Commercial Dishwashers can Save Millions of BTU's & Hundreds of Dollars Annually

The Molitor dx Waste Energy Transfer System

The energy used to heat hot water for washing dishes results in one of the highest energy costs a foodservice operator must face. Even a small commercial dishwasher wastes over 140,000 gallons of hot water each year: that equals over 100 million BTU's down the drain.

Today, Molitor, Inc. has an alternative to wasting that energy—the Molitor dx Waste Energy Transfer

System for commercial dishwashers. This simple yet effective device recycles 70% to 75% of the energy normally wasted by a dishwasher and returns it to the hot water heater. Here's how it works:

During the dishwasher rinse cycle, the hot waste water normally thrown away now drains into the

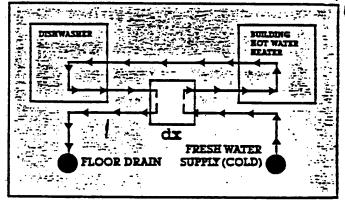
DISHW	ASHER				EOT V	ING WATER
				14. E.		
: -	1 - 2 . 1 -					
	FLO	or drain	FRES	H WA	TER (LD)	

Without dx : Energy Wasted To Floor Drain

ANNUAL SAVINGS Sample

Gallons Used	BTU's Saved
100.000	63,380,000
300,000	190.140.000
*500.000 ***	316.900.000

lower section of the dx unit. A switch senses the water and actuates a pump which circulates this hot water through the heat exchanger. At the same time, cold fresh water is moving counterflow through the dx where it picks up heat from the waste water. After this transfer takes place, the cooled waste water drains to a normal floor sink and the pre-heated fresh water moves on to the building water heater.



With dx: Energy Recycled To Hot Water Heater

BENEFITS & FEATURES

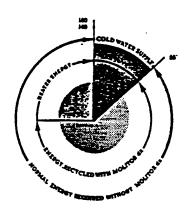
- Recycles 70% to 75% of the recoverable energy normally wasted by a commercial dishwasher.
- Uses this energy to pre-heat the cold water supply to the building hot water heater.
- Helps solve hot water shortage problems in existing toodservice operations.
- On new installations or remodels, the dx can reduce your hot water heater size.
- Works with both high or low temperature machines.

- Improves grease trap efficiency by reducing waste water temperatures.
- Compact, self-contained unit tits u dishtable.
- Only two moving parts.
- Easily installed, easily maintained.
- A complete separation of waste and political water to comply with plumbing sanitation codes. LA.P.M.O. approved.
- Qualifies for investment and energy tax credits.
 - Tested and efficiency, certified by an independent testing laboratory. Test data available on request

ENERGY SAVINGS

The Molitor dx Waste Energy Transfer System Cycles 70% to 75% of the recoverable energy armaily wasted by a commercial dishwasher. Depending on business volume, energy costs, and the type of dishwasher, the dx will pay for itself in 1/2 to 3 years. As energy costs continue to increase, so do your savings.

A complete, no obligation energy analysis is available for your particular operation. Simply complete the attached reply card and drop it in the mail. See how much you could be saving by RECYCLING ENERGY!



SIZING

The dx Waste Energy Transfer System is available in two standard sizes.

The dx-2 is designed to work with most single tank. door-type dishmachines and those which use 2 gallons or less during a complete washing cycle.

The dx-4 is sized for those machines which use up to 6 gallons of water per complete cycle or less than 6 gallons per minute.

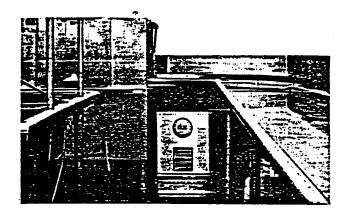
Consult your dishwasher specifications for water usage information or contact Molitor, Inc. for correct sizing.

ENERGY TAX CREDIT

The Molitor dx Waste Energy Transfer System is designed and manufactured for the sole purpose of reducing the amount of energy consumed in any "dustrial or commercial facility, both new and asting. When installed in connection with an existing facility, the Molitor dx is intended to quality for energy tax credits.

Consult your tax advisor with any specific questions regarding this issue.

SPECIFICATIONS

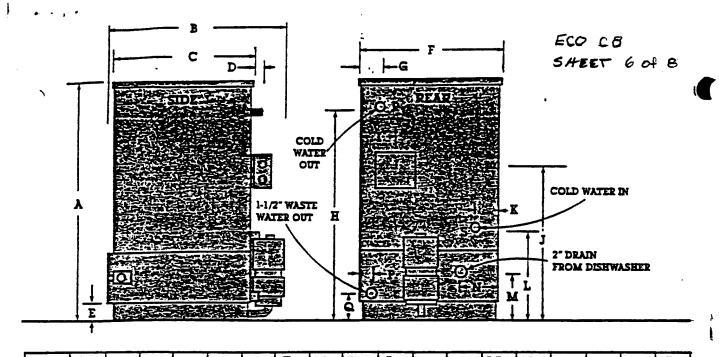


Dishmachine Waste Water Heat Exchanger shall be a self-contained, compact unit sized to fit beneath dishtable adjacent to dishmachine. The unit shall be capable of transferring heat from the hot waste water of the dishmachine to the fresh, incoming water supply for the building water heater. The Heat Exchanger shall be fabricated to provide a complete separation of the fresh, potable water from the dishmachine waste water and shall be approved by the International Association of Plumbing and Mechanical Officials as meeting all requirements of the Uniform Plumbing Code. All electrical components shall be U.L. Classified.

Waste Water Heat Exchanger shall be Molitor dx Series Waste Energy Transfer System as distributed by Molitor. Industries Inc. of Englewood. Colorado 80110.

WARRANTY

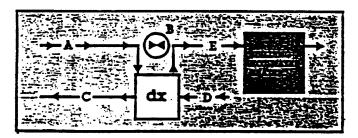
The Molitor dx Waste Energy Transfer System carries a one year guarantee on all parts and materials and a 90 day guarantee on labor. Refer to Owners Manual for complete details on this warranty.



M B H K N

PLUMBING

.ne dx unit should be hard piped to ground (cold) water and to the hot water heater. The pre-heated line from the dx to the water heater should be insulated to prevent heat loss. The drain connection from the dishwasher to the dx can be hard piped or hose connected. (Verity with Local Plumbing Code)



MOLITOR PRODUCTS PRODUCED UNDER U.S. AND FOREIGN PATENTS.

The Molitor ax Waste Energy Transfer System is approved by the International Association of Plumbing and Mechanical Officials meeting the requirements of the uniform Plumbing Code also by the City of Los Angeles, CA Mechanical inspection Department.

ELECTRICAL

Requirements: 120V, 2.1 Amps.



- A. Cold Water Supply.
- B. By-Pass Arrangement. Used only when line size to water heater is larger than dx line Size.
- C. 1-1/2" Indirect Waste Line.
- D. 2" Drain from Dishwasher.
- E. Pre-heated Water Line to Hot Water Heater (insulated).

1980 Molitor Industries Inc Specification subject to change without notice.

MOLITOR INDUSTRIES INC.

dx Division

2829 South Santa Fe Drive P.O. Box 1218 Englewood, Colorado 80150 303-789-2231 - 800-525-9494

TWX 910-933-0179



<u> </u>		 		Date Prepared		Sheet	OF
CONSTRUCTION COST ES	TIMAT	Έ		February	1993	7	ප
Project				Project No.	Basis for Est	mate	
EEAP Limited Energy Study				16-403-10			
Location					Code A (no	design competed	i)
Fort Hunter-Liggett, California							
Engineer-Architect							
Keller & Gannon		Estimato	r		Checked By		
ECO-C8 Dishwasher Heat Recovery		RJB	•		ВІН		
LOO-OB DISTIWASTIET FIEAT NECOVERY	Qu	antity	Le	abor	Mate	erial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
Building 206							
Molitor or Equal Unit	1	Ea	\$352	\$352	\$1,217	\$1,217	\$1,569
Drain Piping 2-inch Galv	20	LF	\$8.99	\$180	\$6.78	\$136	\$315
Water Piping 1-inch CU	130	LF	\$6.14	\$798	\$3.52	\$457	\$1,256
Pipe Insulation 1-inch @ pipe	130	LF	\$2.52	\$328	\$1.47	\$191	\$519
Wiring	-	Job	\$100	\$100	\$50	\$50	\$150
Subtotal Building 206							\$3,808
Sales Tax 8%							\$305
Contractor O.H. & P 30%							\$1,142
Sub Total							\$5,255
Bond 1%				1			\$53
Sub Total							\$5,308
Estimating Contingency 10%							\$531
Total Probable Construction Cost							\$5,839
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Life Cycle Cost Analysis Summary **Energy Conservation Investment Program (ECIP)**

ECO C9

25%

Sheet 8 of 8

Location: Fort Hunter Liggett, California Region No. 4 Project No. 16-403-10 Project Title: Dishwasher Heat Revovery Fiscal Year FY96 Discrete Portion Name: ECO# C-8, Bldg 206 Analysis Date: March 1993 Economic Life: 15 YEARS Preparer: KELLER & GANNON 1. Investment Costs A. Construction Costs \$5,839 B. SIOH \$321 C. Design Cost \$350 D. Total Cost (1A+1B+1C) \$6,510 E. Salvage Value of Existing Equipment \$0 F. Public Utility Company Rebate \$0 G. Total Investment (1D-1E-1F) \$6,510 2. Energy Savings (+)/Cost(-): Date of NISTIR 85-3273-X Used for Discount Factors **Energy** Cost Saving Annual \$ Discount Discounted Source \$/MTBU/(1) MBTU/YR(2) Savings(3) Factor(4) Savings(5) A. Elec. \$21.84 0.0 \$0 11.70 \$0 B. Dist \$4.98 339.0 \$1,688 13.78 \$23,263 C. Propane \$7.87 0.0 \$0 14.16 \$0 D. Demand \$108.60 0.0 \$0 11.70 \$0 E. Other F. Total \$1,688 \$23,263 3. Non Energy Savings (+) or Cost (-): A. Annual Recurring (+/-) (\$160)(1) Discount Factor (Table A) 11.12 (2) Discounted Savings/Cost (3A x 3A1) (\$1,779) B. Non Recurring Savings (+) or Cost (-) Item Savings(+) Year of Discount Doscounted Sav-Cost(-)(1) Occur. (2) ings(+)Cost(-)(4) Factor(3) a. b. C. d. Total C Total Non Energy Discounted Savings (3A2+3Bd4) (\$1,779)4. Simple Payback 1G/(2F3+3A+(3Bd1/Economic Life)): 4.3 Years 5. Total Net Discounted Savings (2F5+3C): \$21,483 6. Savings to Investment Ratio (SIR) 5/1G: 3.30 7. Adjusted Internal Rate of Return (AIRR):

Keller & Gannon

COMPUTATION SHEET

Engineers-Architects

COMPUTED BY JCS	FC0#C9	PROJECT FHL EEAP
Dul		10-403-10
CHECKED BY DATE FERCUARY 1993	AUTOMATIC BOILER	
DATE FEBICUARY 19 19	FLUE DAMPERS ON	SHEET NO/_ OF SHEETS
REV 19	FLUE DAMPERS ON	STILL THOSE OF THE STILL

DAW SYSTEMS

DESCRIPTION OF WORK

THE OPPORTUNITY LOOKS AT THE POTENTIAL ENERGY SAVINGS CREATED BY THE INSTALLATION OF A DAMPER WHICH CLOSES OFF THE FLUE WHEN THE BOILER IS RUNNING IN STAND BY MODE.

ABOUT 2.3% OF THE BOILERS CAPACITY THROUGH LOSSES THROUGH THE FLUE UNDER CHANDBY CONDITIONS.

BUILDINGS INCLUDED

SEE ATTACHED PRINT-OUTS

ENERGY SAUTUGS CALCULATIONS

ENERGY SAUINGS ARE DETERMINED BY

ASSUMING A 1.5% THERHAL EFFICIENCY

EMPROVEMENT IN FIRED EQUIPMENT USED

TO HEAT DHOW. SAUKAS ARE

CALCULATED AS FOLLOWS

WHERE: QS = FUEL SAUINGS

QO = BASELINE (AFTER REDUCTION OF DHW TEMPS TO AUTH, LEVELS & ELO C-1) FUEL USE

sec e-1) ruel use

7 = BASELINE DAW HEATING EFFICIENCY

				Date Prepared		Sheet	OF
CONSTRUCTION COST E	STIMAT	Έ		February	1993	2	
Project				Project No.	Basis for	`	
EEAP Limited Energy Study				16-403-10	1		
Location				1	Code A	(no design comp	eted)
Fort Hunter-Liggett, California					1		
Keller & Gannon							
Drawing No.		Estimate	or		Checked	By	
ECO-C9 Install Automatic Flue Damp	ers on	RJB			він	•	
	Qu	antity		bor	<u> </u>	Material	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
GAS FIRED HEATERS							51174 July
4-inch Diameter Auto-Damper	1	Ea	32.00	\$32	\$134	\$134	\$166
Relay & Wiring	-	Job	-	\$120	-	\$60	\$180
Subtotal 4-inch Flue, Gas Fired							\$346
Sales Tax 8%							\$28
Contractor O.H. & P 30%							\$104
Sub Total							\$478
Bond 1%							\$5
Sub Total							\$483
Estimating Contingency 10%							\$48
Total Probable Construction Cost							\$531
6-inch Diameter Auto-Damper	1	Ea	34.90	\$35	\$138	\$138	\$173
Relay & Wiring	-	Job	•	\$120	-	\$60	\$180
Subtotal 6-inch Flue, Gas Fired							\$353
Sales Tax 8%							\$28
Contractor O.H. & P 30%							\$106
Sub Total							\$487
Bond 1%							\$5
Sub Total							\$492
Estimating Contingency 10%							\$49
Total Probable Construction Cost							\$541
8-inch Diameter Auto-Damper	1	Ea	38.40	\$38	\$152	\$152	\$190
Relay & Wiring		Job	-	\$120	-	\$60	\$180
Subtotal 8-inch Flue, Gas Fired							\$370
Sales Tax 8%							\$30
Contractor O.H. & P 30%							\$111
Sub Total							\$511
Bond 1%							\$5
Sub Total							\$516
Estimating Contingency 10%							\$52
Total Probable Construction Cost							\$568

<u></u>				Date Prepared		Sheet	OF
CONSTRUCTION COST E	STIMAT	Έ		February ⁻	1993	3	8
Project				Project No.	Basis for	Estimate	
EEAP Limited Energy Study				16-403-10	Code A	(no design comp	atad)
Location Fort Hunter Liggett Colifornia					Code A	(uo design comp	eteu)
Fort Hunter-Liggett, California Engineer-Architect					1		
Keller & Gannon							
Drawing No.		Estimato	r		Checked	Ву	
ECO-C9 Install Automatic Flue Dam	pers on	RJB antity	та	ıbor	BIH	faterial	
Line Item	No. Units	Unit Meas.	Per Unit	Total	Per Unit	Total	Total Cost
OIL FIRED HEATERS							
4-inch Diameter Auto-Damper	1	Ea	32.00	\$32	\$156	\$156	\$188
Relay & Wiring	-	Job	-	\$120	-	\$60	\$180
Subtotal 4-inch Flue, Oil Fired							\$368
Sales Tax 8%							\$29
Contractor O.H. & P 30%							\$29
Sub Total							\$426
Bond 1%							\$4
Sub Total							\$431
Estimating Contingency 10%							\$43
Total Probable Construction Cost							\$474
6-inch Diameter Auto-Damper	1	Ea	34.90	\$35	\$161	\$161	\$196
Relay & Wiring		Job	-	\$120	-	\$60	\$180
Subtotal 6-inch Flue, Oil Fired				· · · · · · · · · · · · · · · · · · ·			\$376
Sales Tax 8%		† · · · · · · · · · · · · · · · · · · ·					\$30
Contractor O.H. & P 30%			····				\$113
Sub Total							\$519
Bond 1%		1					\$5
Sub Total		i					\$524
Estimating Contingency 10%							\$52
Total Probable Construction Cost				***************************************		İ	\$576
8-inch Diameter Auto-Damper	1	Ea	38.40	\$38	\$161	\$161	\$199
Relay & Wiring	<u> </u>	Job	-	\$120	-	\$60	\$180
Subtotal 8-inch Flue, Oil Fired				¥		,	\$379
Sales Tax 8%							\$30
Contractor O.H. & P 30%							\$114
Sub Total							\$524
Bond 1%							\$5
Sub Total			*				\$529
Estimating Contingency 10%							\$53
Total Probable Construction Cost							\$582

Fac		ECO	ECO C3	Energy Savings:		Automatic Flue Dampers	DAIS					
Š.	Installation Name	ن		Propane		FO Ann.	o. Ann.	Elec. Ann.	221	Constr	Investment	SIB
		nol.	Mil BTU/Yr	Mil BTU/Yr	MW-Hr/Yr	\$ Savings		\$ Savings	Savings	Cost		
9	Family Housing NCO & Enl	Yes	•	1.07	,	0\$		\$0	\$120	\$531	\$592	0.50
P 41A	Family Housing NCO & Eni		•	•	•	\$	\$0	\$0	\$	•	-	•
P 41B	Family Housing NCO & Enl		-	-	•	\$0	\$0	0\$	0\$	•	•	•
P 42A	Family Housing NCO & Enl		1		•	0 \$	\$0	\$0	0\$	•	•	•
P 42B	Family Housing NCO & Enl		•	•	•	0\$	\$0	0\$	0\$	•	•	
P 43A	Family Housing NCO & Enf		•	-	•	\$0	\$0	\$0	\$0	1	•	•
P 43B	Family Housing NCO & Enl		•	-	•	\$0	\$0	\$0	0\$	•		•
P 44A	Family Housing NCO & Enl		•	•	٠	\$0	\$0	\$0	\$0	•		
P 44B	Family Housing NCO & Enl		•	-	•	0\$	\$	\$0	\$0		•	·
P 45A	Family Housing NCO & Enl		٠	-	•	\$0	\$0	\$0	\$0	•	•	•
P 45B	Family Housing NCO & Enf		•	1	•	\$0	\$0	\$0	\$0	•	•	
P 46	Family Housing CG & WO		•	•	•	\$0	\$0	\$0	\$0	1	•	
P 47	Family Housing CG & WO		•	•	•	\$0	\$0	\$0	\$0	•		
P 51A	Family Housing NCO & Eni		•	-	•	\$0	\$0	\$0	\$0	•	•	
P 51B	Family Housing NCO & Enl		•	•	•	\$0	\$0	\$0	\$0	•	•	
P 52A	Family Housing NCO & Enl		ı	•	•	\$0	\$0	\$0	0\$,	•	•
P 52B	Family Housing NCO & Ent		•	-	•	\$0	\$0	\$0	\$0	•	•	
P 53	Family Housing CG & WO		•	•	•	\$0	\$0	\$0	0\$	•		•
P 54	Family Housing CG & WO		•	1	•	\$0	\$0	\$0	\$0	•		•
P 55	Family Housing CG & WO		•	•	•	\$0	0\$	\$0	\$0	٠	1	
7 56	Family Housing CG & WO		•	•	•	\$0	\$0	\$0	0\$	•	•	•
P 57	Family Housing CG & WO		•	•	•	\$0	\$0	\$0	\$0	•	1	'
P 58	Family Housing CG & WO		•	•	1	0\$	0\$	\$0	\$0	•	•	•
29	Family Housing CG & WO		•	•	•	\$0	\$0	\$0	0\$	•		•
P 60	Family Housing CG & WO			•	•	\$0	\$0	\$0	\$0		٠	•
S 79	Post Office, Main		'	1	•	\$0	\$0	\$0	\$0	•	1	•
1 80	Exchange, Main Retail			-	•	\$0	\$0	0\$	0\$	1	•	•
- B	Ineater with Dressing Rm's		1	•	•	\$0	\$0	0\$	\$0	•	•	•
1017	Open Din Cons (Hacienda)	Yes		2.59	٠	\$0	\$20	0\$	687\$	\$268	\$633	0.46
	Club (Bar)	Xes		0.50	•	\$0	\$4	\$0	\$56	\$531	\$592	0.09
	Hacienda, Dwellings	\ es		1.57	•	\$0	\$12	\$0	\$175	\$568	\$633	0.28
		Ş		2.41	•	\$0	\$19	0\$	\$269	\$568	\$633	0.42
9116	Exchange Service Station		-	•	•	\$0	0\$	\$0	\$0	•		•
	(Non-snop areas)		•	-	,	\$0	\$0	\$0	\$0	,	•	1
120	Fire Station - Office	Yes		0.68	•	\$	\$2	\$0	92\$	895\$	\$633	0.12
	Fire Station - Dorm	Se Kes	•	4.01		\$	\$32	\$0	\$447	\$268	\$633	0.71
	rife Station - Garage		-	•	•	 0\$	 9		# 0\$	•	<u>.</u>	1

Installation Name	ရ ပ	Fuel Oil	Propane	Electric	FO Ann.	Prop. Ann.		သ	Constr	Investment	SIR
	Incl.	Mil BTU/Yr	Mil BTU/Yr	MW-Hr/Yr	\$ Savings	\$ Savings		Savings	Cost		
Bowling Center	Yes	•	0.90	•	\$0	2\$	0\$	\$100	\$531	Z6 2 \$	0.17
		•	_	-	0\$	0\$	0\$	0\$	•	-	
Family Housing LC & MJ	Yes	-	2.15	•	\$0	\$17	\$0	\$240	\$531	\$592	0.40
Officers Quarters Military	Yes	-	2.49	•	0\$	\$20	0\$	\$278	\$568	\$633	0.44
Officers Quarters Military	Yes	-	15.78	•	\$0	\$124	0\$	\$1,759	\$568	\$633	2.78
Family Housing CG & WO	Yes	•	2.23	•	\$0	\$18	\$0	\$249	\$531	\$592	0.42
Gymnaslum		•		•	0\$	0\$	0\$	\$0	•	•	
FE Facility		-	•	•	0\$	₩	0\$	\$0	•	٠	
Family Housing NCO & Ent	Yes	•	2.12	•	0\$	\$17	0\$	\$236	\$531	\$592	0.40
FE Facility - Shop		•	•	٠	Ģ	င္တ	\$0	\$0		•	
FE Facility - Office		•	-	•	\$0	\$0	\$0	0\$	•	•	
Vehicle Storage		•	•	•	0\$	\$0	\$0	\$0	•	•	,
Admin General Purpose		•	•	•	0\$	\$	0\$	0\$	•	•	•
Elec Maint. Shop		•	-	•	\$0	0\$	\$0	0\$	•	•	
Officers Quarters Military		•	-	•	0\$	0\$	\$0	0\$	•	•	
Admin General Purpose		•	•	-	\$0	\$0	\$0	0\$	•	•	
Admin General Purpose		•	-	•	\$0	\$0	\$0	0\$	•	•	,
Officers Quarters Military		•	•	•	0\$	0\$	\$0	0\$	•	,	•
Officers Quarters Military		•	•	•	\$0	0\$	0\$	0\$	-	•	1
General Purp Warehouse		1	•	1	\$0	0\$	0\$	0\$	•	•	•
Cold Storage Warehouse		•	•	•	\$0	\$0	0\$	0\$	•	•	•
Technical Library		1	1	•	\$	\$0	\$0	\$0	•	•	•
Child Development Cntr		٠	•	4	\$0	\$0	\$0	0\$	٠	•	•
Commissary		•	•	•	\$0	\$0	\$0	\$0	•	•	•
Sup Svc Admin Bldg		•	•	•	₽	\$	\$0	0\$	•	•	•
Post Chapel		•	•	•	\$	\$0	\$0	\$0	•	-	•
Admin Bldg R&D - Office		1	•	1	\$0	\$0	\$0	\$0	•	•	•
Admin Bidg R&D - Electronics		•	•	1	\$0	\$0	\$0	0\$,	,	•
General Inst Bidg		•	•	•	0\$	\$0	0\$	0\$	•	•	•
Admin General Purpose	Yes	1.52	•	•	\$8	\$0	\$0	\$104	\$585	\$649	0.16
Company HQ Building		•	1	•	\$0	\$0	\$0	\$0	•	1	•
Enlisted Pers Dining Fac	Yes	18.78	•	•	\$94	\$0	0\$	\$1,289	\$1,164	\$1,298	0.99
Kitchen Area - Scullery		•	•	1	\$0	\$0	0\$	\$0	•	•	•
Eni Barracks w/o Dining	Yes	7.20	1	•	\$36	\$0	\$0	\$494	\$585	\$649	0.76
Company HQ Building		-	•	•	\$0	\$0	\$0	\$0	•	•	•
Eni Barracks w/o Dining	Yes	7.70	•	•	\$38	0\$	\$0	\$528	\$285	\$649	0.81
Company HQ Building		•	•	٠	0\$	0\$	0\$	0\$	•	•	•
	T 127 Officers Quarters Military P 128 Officers Quarters Military T 131 Family Housing CG & WO S 144 Gymnaslum S 146 FE Facility T 149 Family Housing NCO & Eni T 156 FE Facility - Office T 161 Admin General Purpose T 162 Elec Maint. Shop T 163 Officers Quarters Military T 164 Admin General Purpose T 165 Admin General Purpose T 165 Admin General Purpose T 165 Admin General Purpose T 165 Admin General Purpose T 165 Admin General Purpose T 165 Admin General Purpose T 165 Admin General Purpose T 172 Cold Storage Warehouse P 177 Technical Library P 177 Technical Library S 186 General Inst Bidg P 177 Admin Bidg R&D - Office S 197 Admin Bidg R&D - Office Admin Bidg R&D - Electronics S 198 General Inst Bidg P 205 Admin General Purpose P 205 Admin General Purpose P 205 Enilisted Pers Dining Fac Kitchen Area - Scullery P 207 Eni Barracks w/o Dining P 207 Eni Barracks w/o Dining P 208 Eni Barracks w/o Dining	tary tary tary tary tary two two two two two two two two two two	tary Yes tary Yes two Yes WO Yes We e e e e e e e e e e e e e e e e e e	### Yes - 2.4 ### Yes - 2.7 #### Yes - 2.7 #### Yes - 2.7 #### Yes - 2.7 ####	### Yes - 2.49 ### Yes - 15.78 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.12 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.23 ### Ent Yes - 2.20 ### Ent Yes -	## Yes	### Yes	tarry Yes 2.49 9 572 tarry Yes 2.49 9 572 tarry Yes 15.78 9 5124 WO Yes 2.23 9 5124 two Yes 2.23 9 5124 two 2.23 50 51 two 2.12 50 51 two 2.12 50 51 two 50 50 50 two 50 50 50	Mary Ves	Marcon Color Col	Mail Vest

:	:			9 Energy Savings:		Automatic Flue Dampers	oers					
o Z	Installation Name	6 0 2	Fuel	Propane	Electric	FO Ann.	Prop. Ann.	Elec. Ann.	227	Constr	Investment	SIR
0000	AAEEC Casely Don	5	MII 510/Yr	MII BIU/Yr	MW-Hr/Yr \$ Savings	\$ Savings	\$ Savings	\$ Savings	Savings	Cost		
200	\top	<u> </u>		-	•	\$0	\$0	\$0	80	•	•	1
2 7 2 2	\dashv	Yes	51.02	-	•	\$254	\$0	0\$	\$3,501	\$576	\$642	5.45
7211	Outdoor Swimming Pool		•	•	1	\$0	\$0	\$0	0\$	-	•	•
7 212	Gymnasium	Yes	•	0.48	•	0\$	\$	\$0	\$53	\$541	\$603	0.09
P 219	Physical Fitness Center	Yes		1.31	•	\$0	\$10	\$0	\$145	\$541	\$603	0.24
P 229		Yes	3.43	•	•	\$17	\$	\$0	\$235	\$582	\$649	0.36
P 229A				•	•	\$0	\$0	\$0	\$0	•		3
P 230		Yes	6.91	•	1	\$34	\$0	\$0	\$474	\$582	\$649	0.73
P 230A			•	•	٠	\$0	\$0	\$0	\$0	•		
\$ 235	Admin General Purpose		1	•	•	\$0	\$0	\$0	0\$	•	1	•
\$ 236	Admin General Purpose		•	•	•	\$0	\$0	\$0	\$	•	•	•
\$ 237	Admin General Purpose		•	•	•	\$0	\$0	\$	\$0	•	•	•
S 238	Sig Photo Lab	Yes	•	0.95	•	\$0	\$7	0\$	\$105	\$541	\$603	0.17
9,0	Process	Yes	•	8.34	•	\$0	\$66	\$0	\$929		•	
7 240 0 240	Admin General Purpose		-	•	•	\$0	\$	\$0	\$0	-	•	•
5 241	GM Facility		•	•	٠	\$0	\$0	\$0	\$0		•	•
			·	•	٠	\$0	\$0	\$0	\$0		•	٠
0,0			-	•	٠	\$0	0\$	\$0	\$0	1	·	
5.243	Admin General Purpose			•	•	\$0	\$0	\$0	\$0		•	•
0 244	Admin General Purpose		•	•	•	\$0	\$0	\$0	\$0	•	•	•
\$ 246	Admin General Purpose		•	•	•	\$0	\$0	\$0	\$0		•	•
5.247	Admin General Purpose		1	•	٠	\$0	\$0	\$0	\$0		•	•
F 252	Venicie Maint Snop US		•	•	•	\$0	\$0	\$0	\$0	•	-	•
P 256	Vehicle Maint Shop ORG		-	•	٠	\$0	OŞ	\$0	\$		•	•
P 259	Vehicle Maint Shop ORG		•	•	٠	\$0	\$0	\$0	\$			•
283	FE Maintenance Shop		•	•		\$0	\$0	\$0	\$0	•		•
300 0	d control		•	•	•	\$0	Q	\$0	\$0	-	•	•
0070	Aurilli General Purpose	<u> </u>	•	•		တ္တ	\$0	\$0	\$0	•	•	•
107 1	necreation building	Yes	•	1.06	'	Ç\$	\$8	\$0	\$118	\$531	\$592	0.20
2070	General Purpose Warehouse	_ ;	•	•		\$0	\$0	\$0	0\$		•	•
257.0	Electron Equip Facility	Yes	1	1.46	•	Ç,	\$11	\$0	\$162	\$541	\$603	0.27
			•	•		\$0	\$0	\$0	\$0			•
1000	Cont numia Warehouse		•		•	SS S	\$0	0\$	0\$	•	'	•
200	Eni Barracks W/o Dining	Yes	•	15.21		S S	\$120	\$0	\$1,696	\$568	\$633	2.68
3	ADF Building		•	•	·	\$	ÇÇ	\$0	\$0	•	•	•
			•		•	S S	\$0	\$0	0\$	٠	•	•
	_		-	•	•	0¢	0 \$		\$0	•	'	•

ECO C-9 Sheef 7of8

Fac		ECO	ECOJECO C9 Ene	Energy Savings: Automatic Flue Dampers	: Automatic	: Flue Dam	pers					
Š	Installation Name	6-0	Fuel C	Propane	Electric	FO Ann.	Prop. Ann.	Prop. Ann. Elec. Ann.	22]	Constr	Investment	SIR
		lici.	Mil BTU/Yr	Mil BTU/Yr	MW-Hr/Yr \$ Savings \$ Savings \$ Savings	\$ Savings	\$ Savings	\$ Savings	Savings	Cost		
P 642	Detached Latrine/Shower	Yes	•	2.18	•	0\$	\$17	0\$	\$243	\$531	\$592	0.41
S 2201	Control Tower - Range SPT		•	•	•	0\$	0\$	0\$	0\$	•	•	•
SIR>1			51.0	31.0	0.0	\$254	\$244	80	\$6,955	\$1,712	\$1,909	3.64
Totals						Totals for \$	Totals for SIR > 1 Bldgs:	gs:	128, 210 and 295 only	d 295 only		

Life Cycle Cost Analysis Summary ECO C9 Energy Conservation Investment Program (ECIP) Sheet 8 of 8

			Region No. 4	npers	Project No. 16-403-10 Fiscal Year FY96
	e: March 1993	5-10, may 5-1	Economic Life:	15 YEARS	Preparer: KELLER & GANNON
1. Investmen	t Costs				
A. Construct	ion Costs		\$1,712	•	
B. SIOH			\$94	•	
C. Design Co	ost		\$103	•	
	t (1A+1B+1C)		\$1,909	ı	
E. Salvage V	alue of Existing E	quipment		\$0	
	ity Company Reb			\$0	_
G. Total Inve	stment (1D-1E-1F)			\$1,909
2 Enorgy So	vings (+)/Cost(-):				
		d for Discount Factor	s		
Energy	Cost	Saving	Annuai \$	Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor(4)	Savings(5)
A. Elec.	\$21.84	0.0	\$0 ~	11.70	\$0
B. Dist	\$4.98	51.0	\$254	13.78	\$3,500
C. Propane	\$7.87	31.0	\$244	14.16	\$3,45 5
D. Demand	\$108.60	0.0	k \$0	11.70	\$0
E. Other F. Total			\$498		\$6,954
3 Non Energ	y Savings (+) or (Coat ():	V.00		ψυ,υυ-
		00st (-).	· · · · · · · · · · · · · · · · · · ·		
A. Annual Re			\$0		
	Factor (Table A)			11.12	
(2) Discounte	d Savings/Cost (3	3A X 3A1)			\$0
B. Non Recur	ring Savings (+)	or Cost (-)			
Item	Savings(+)	Year of	Discount	Doscounted Sav-	
	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4)	
a.					
b.					
C.					
d. Total		-			
C Total Non E	nergy Discounted	d Savings (3A2+3Bd4	4)	\$0	
		A+(3Bd1/Economic L	_ife)):	3.8	Years
	iscounted Saving			\$6,954	
	Investment Ratio			3.64	
7. Adjusted In	ternal Rate of Ret	urn (AIRR):			

Keller & Gannon

Engineers-Architects

001111 0122 31	Rel_	RETROFIT E	XTERIOR		PROJECT	16-403-10
CHECKED BY ✓ ₹B.R.v	1993 PAA	LIGHTING WIT	TH HPS H	IXTURES		
REV.	19	EC0#	D3		SHEET NO	1 OF 1 SHEE
DESCRIPTION THIS EC	••	-TION ES EXISTING	MERCURY	UAPOR 1	IND QUI	ARTZ EXTERIOR
	EVALUAT	MORE EFFICIEN	THE FOI	Invitat com	enz Oue-ko	
No. Exist	1269	Propose	D	% CHANG	15	
175W	my	100W	HPS	+12		BALLAST+ LAMP
3. 250W	m1	isow 1	HPS	+ 23		
c 400W	mV	250m	HPS	+ 22		*
D: 1000 W	STARNO	200W	j16₹	+_l _	•	EN LuminAIRE
					(F)	HUDS & CONRTS)
UNIT RE	MOFIT L	L ANALYSIS				ANNAL
10 EXIST WATES	PROPOSED	WATE REDUCTION	<u>40 m</u>	Hours/yr	USE FACT	or Samus Km
A 197	130	.067	4,	160		195
B. 285	173	.112	4,	160	טר,	326
c. 469	302	. 167	4,	160	.70	486
D. 1000	240	.760		200	1.00	152
					<u></u>	
NO. MATLS	LABOR \$	CEBATE INVEST.	SAWINGS	Zumra 31	SANNES	TOTAL SAVINGS SIR
A 186	34	348	(64)	30	142	108 0.31
B 198	36	40 362	(35)	<u> </u>	237	253 0.70
L 766	37	60 462	(56)	76	354	374 0.81
D: 330	107	60 686	38	345		494 0.72
			ع : ر	5.74		
1 INVESTMENT	= [[MAT'L	(1.08) + LARIZ] X	1.30 × 1.0	x1.10 × 1.	1155 - 1	GHE REBATE
		HOVIRS X CUST LAMP LIKE X RIELA			× WY	OK XIII. 12
3) Knd SAVING	< < Km	SAVINGS X 7 40.	80/Km x	11. 12 NAV	J. T	
4) KWH SAVING	८ = ८००भ	SAVIMAS X* D. DI	6223/ KWI	4 x 11.70	WPv1*	
	T-7 A6	SIVE MINT ANAL	rese To			TACT SEESETAL

FORM 101-1/8

Keller & Gannon

Engineers-Architects

COMPUTED BY RCL	REPEACE INCANDESCENT	PROJECT 16-403-10
CHECKED BY	LIGHTING WITH FLUORESCIENT	
REV	ECO # D+	SHEET NO. 1 OF 35 SHEETS

DESCRIPTION OF ACTION

THIS PROTECT WULLD REPLACE IN EFFICIENT INCANDESCENT FIXTURES

WITH EFFICIENT COMPACT FLUORESCENT FIXTURES OR FOR FOOT

FIXTURES WITH ELECTRONIC BALLASTS AND TO LAMPS. REPLACEMENTS

ANALYZED ARE AS FOLLOWS:

DATA & ASSUMPTIONS

	EXISTIN	G INCANDESCE	7.	REPLA	EMENT	KLUORES	ENT
DES16-	WATTS	MEAN LIFE (HRS)	RELAMPING WST	TYPE	WATTS	MEANUFE	RIELAMP. COST
A	60	1000	152 + 152 LABOR	13W/5TH	17	10,000	1000 + 300 LAR
В	75	750	1597 + 150 LABIR	1811774	25	19'029	100 1300 LAR
	100	750	200 + 150 LABIR	1821774	25	10,000	104+34 LAC
D	150	750	250+ 150 LABIR	26W/8T4	37	10,000	15=+300 LAR
· E	250	750	275 + 150 LAROR	2-43478	61	20,000	800 +525 LAB
F	300	750	445 + 150 LABOR	2- F32/78	61	20,000	82+23- TAL

Screening ANALYSIS

ો દેવાજે.	KW SAVINGS	LABOR CAST	MATILLER	COST.	1 1	TOTAL 3]. INVIKT.	BREAKQUEN HOWIS/ YEA	BP IR
A	0.043	35	40	130	15	1155	1,070	
B	0.050	35	40	130	1.5	115	825	
۷	0.075	35	40	130	15	115	190	
D	0.113	44	60	181	15	166	220	
= = = = = = = = = = = = = = = = = = = =	0.189	53	75	217	25	192	٥	÷
F	0.239	₹ 3	75	217	25	192	6	

11 TOTAL LOST = (LABOR + MATIL) x 1.08 x 1.30 x 1.01 x 1.10 x 1.115

I BREAKEVEN OPHONES/YEAR = TOTAL ENGETMENT - (KW SAUMES 2 108.60/kW x 11.70)

KWSAVINGS x 80,07454 x 11.70 + / RELAMP 8 - RELAMP 8/11.12

31 TOTAL INVESTMENT = TOTAL LOST - PGAE REBATE

NOTE! ANALYSIS SUMMARIES ON SHEETS 3 THROUGH 7

DETAILED ANALYSES PER RETROFIT TYPE: SHEETS 8 THROUGH 3

CATALOG CUTS: SHEETS 32 THROUGH 35

Σ	Keller	&	Gannon

Engineers-Architects

COMPUTED BY RCL	REPLACE INCANDESCENT	PROJECT FIL EEAP
CHECKED BY TANE 1973	LIGHTING WITH FLUORESCENT	
REV19	ECO #D4	SHEET NO. 2 OF 35 SHEETS

ADDITIONAL ASSUMPTIONS ARE AS FOLLOWS:

1. HOURS OF LAMP OPERATION BASED ON FIELD SURVEY DATA.

2 AMNUAL USAGE SAVINGS = NO. FIXTURES X KW SAVINGS/FIXT X OP HAS/ YR.

3. Annial NSABE COST SAVINGS = KUH x \$ 0.07454

T. ANNUAL OFM COST = OP HRS/YR X RELAMP COST EXKT - RELAMP COST

SAULUS

MEAN LIFE

REAM LIFE

REAM LIFE

REAM LIFE

S. LCC SAVINGS = ANNUAL OFM WST SAVINGS X 11.12 +

Annaal Kwit was Savings x 11.70 +
Annaal Kw was Savings x 11.70.

WHERE AMMAR KW LAST SAVINGS = ICW SAVINGS X 108.60

THE PROPOSED RETROFITS ARE DESCRIBED AS FOLLOWS:

PETRAFITS A, B AND C: REPLACE EXISTING SURFACE MOUNTED INCAMDESCENT
FIXTHE WITH GO - LOW LAMPS WITH COMPACT
ELIMPESCENT FIXTHISE WITH 13W/5TH TO 18W/7TH 1AM

FLYURESLENT FIRTARE WITH 13W/5T4 TO 18W/7T4 LAMP

RETWEIT D

RETROKIT EXISTING RECUSCED INVANDESCENT DOWNLIGHT (150W LAMP) WITH FLAURESCENT BALLAST AND SOURCE ADAPTER FOR Zbw/874 (UNAD LAMP.

RETRUFIT E AND F

REPLACE EXISTING SUSPENDED IN LANDESCENT
FIXTURE (250 - 300W LAMPS) WITH INDUSTRIAL
PENDANT - MOUNTED F LUNRESCENT PIXTURE
CINTATION 2 - F32/T8 LAMPS AND ELECTRONIC
BALLAST.

ECO D-4 SHEET SOF 35

SUMMARY OF ECO D-4: REPLACE INCANDESCENT LIGHTING WITH FLUORESCENTS

ECO	SUMM	IARY OF EC	SUMMARY OF ECO D4 ANALYSES	SES								
No.		Energy Savings	ngs			O&M	LCC Savings (Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs	KWH/Yr	Fxtrs kWH/Yr kW Demand Use \$/Yr D	Use \$/Yr	Demand \$/Yr	\$/√₽	₩	₩	₩	₩.	₩	
A: I-60W Savings	181	22,623	80	\$1,686	\$845	\$894	\$39,564	\$21,175	\$23,610	\$2,715	\$20,895	1.89
B: I-75W Savings	8	208	7.0	\$16	\$11	\$11	\$433	\$234	\$261	\$30	\$231	1.88
C: I-100W Savings	27	4,922	5	\$367	\$220	\$221	\$9,322	\$3,159	\$3,522	\$405	\$3,117	2.99
D: 1-150W Savings	3	7,286	4	\$543	\$380	\$219	\$13,243	\$5,029	\$5,607	\$465	\$5,142	2.58
E: I-250W Savings	20	7,862	4	\$586		\$208	\$13,976	\$3,900	\$4,348	\$500	\$3,848	3.63
F: I-300W Savings	83	4,124	ស	\$307	\$597	\$125	\$11,976	\$4,485	\$5,000	\$575	\$4,425	2.71
TOTALS	284	47,025	23	\$3,505	\$2,464	\$1,680	\$88,515	\$37,981	\$42,348	\$4,690	\$37,658	2.35
	TOTA	SONLY FC	TOTALS ONLY FOR BUILDINGS WITH SIR'S	S WITH SIF	R's OVER 1.0							

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP) Sheet 4 of 35

ECO D4

-		lescent to Fluorescent	Region No. 4			Project No. 16-403-10 Fiscal Year FY96
	ion Name: TOTAL F e: March 1993	HOJECI	Economic Life:	15	YEARS	Preparer: KELLER & GANNON
	on Costs	.:	\$37,981 \$2,089 \$2,279 \$42,348	<u>-</u> - -	\$0	
F. Public Utili	ty Company Rebat	-			(\$4,690)	— \$27.659
2. Energy Sa	vings (+)/Cost(-):	for Discount Factors		_		\$37,658
Energy Source	Cost \$/MTBU/(1)	Saving MBTU/YR(2)	Annual \$ Savings(3)		Discount Factor(4)	Discounted Savings(5)
A. Elec. B. Dist C. Propane D. Demand E. Other F. Total	\$21.84 \$4.98 \$7.87 \$108.60	160.5 0.0 0.0 22.7 kW	\$3,505 \$0 \$0	=	11.70 13.78 14.16 11.70	\$41,011 \$0 \$0 \$28,828
3. Non Energ	y Savings (+) or C	ost (-):		-		
• •	curring (+/-) Factor (Table A) d Savings/Cost (3A	A x 3A1)	\$1,680	-	11.12	\$18,677
B. Non Recur	rring Savings (+) or	r Cost (-)				
ltem	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)		Doscounted Sav- ings(+)Cost(-)(4)	
a. b. c. d. Total			-	=		· ·
C Total Non B	Energy Discounted	Savings (3A2+3Bd4)			\$18,677	
5. Total Net D 6. Savings to	/back 1G/(2F3+3A Discounted Savings Investment Ratio (S Internal Rate of Retu	SIR) 5/1G:)):		4.9 \$88,515 2.35 10.10%	Years

ECO DASHEET SOF35

ECO D-4 REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: SUMMARY OF TOTAL PROJECT

Fac	SIR > 1.0 D4A	ñ	OH V 1.0 D48	ถึ	מלמסיי א בוס				1505. / 15		F0 2: 1 = 5			
Q	Energy Savings kWH/Y kW Dem	Ei and K	Energy Savings Energy Savings kWH/Y kW Demand kWH/Y kW Demand		Energy Savings kWH/Y kW Den	nand	Savings Energy Savings KW Demand KWH/Y KW Demand	Ener KWH	Savings Energy Savings Energy kW Demand kWH/Y kW Demand kWH/Y	E E	Energy Savings kWH/Y kW Dema	Ener	Savings Energy Savings kW Demand kWH/Yr kW Demand	nand
16	•		•			0.2						-	131	0.2
P 41A			•		•	•					•	•		•
P 41B	•				•	•		•			•	•	•	•
P 42A	•		•		•	•	•		•		•	•	•	٠
P 42B	•		•		•	•	•	,	•		•			•
P 43A	•		ı		•	•	•	,						•
P 43B	•	•	•		•	•	•		•		•			•
P 44A	•	•	•	,	•	٠			•		•	•		•
P 44B	•					•	•	•	•		•		•	٠
P 45A	•		•			•	•	•	•	•	•	•		٠
P 45B	•	1	1		•	٠	•				•	•		•
P 46	•		•		•	•	•			•	•			•
P 47	•	•			•	•	•		•					•
P 51A	•	1	•	٠	ı	٠	•		•		•	,		•
P 51B	•		•		•	•	•		•		•			٠
P 52A	•		•		•	•	•	•	i		•		•	•
P 52B	•		•			•	1		•		•		•	•
P 53	٠.		•		•	•	•		•	•	•		•	•
P 54	•		•		•	•	•		•		•			•
P 55		•	•			•	•		•		•		•	•
P 56			•		•	•	•			ı	•		•	•
P 57	•		•		•				•				•	•
P 58	•				•	•	•		•		•			•
P 59	•		•			•	•		•	•	•	•		•
P 60	•		•			•			•		•			•
S 79	•				•	•	•		•		•	•		•
P 80	•		•		86	0.2	•		•		•	•	86	0.2
P 81	•	•	•		•	•	•		•	•	783 4	6.4	783	4.8
P 101	•		•			•	•		•		•		•	•
P 116	•	•	•		•	٠	•		•		•		•	•
T 120	1,803	4.0	ı		349	0.1			•	က	3,341 0	0.7 5,	5,493	1.2
T 121	250	0.1	•	,	218	0.1	•		•			•	469	0.2
r 124	•				•	•	•		•		•	•	•	٠
r 127		6.0	•	,	3,123	0.	•		•		•	9	6,016	6.
P 128		2.2	•		•	•	•		1		•		6,887	22
T 131	•		•		•	•	•				•			•
2 144	•			,		•								

ECO D-4 REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: SUMMARY OF TOTAL PROJECT

Energy kWH/Y	Energy Savings Energy kWH/Y kW Demand kWH/Y	Energi d kWH/)	Energy Savings kWH/Y kW Demand		Energy Savings kWH/Y kW Demand		Energy Savings kWH/Y kW Demand		Energy Savings kWH/Y kW Demand		Energy Savings kWH/Y kW Demand	Energy S kWH/Yr	avings kW Demand
			•		1		1				1		
•	•		•	99	0.1	٠			-	•	•	8	0.1
80	0.0		•	•	•	•		•	•	•	•	80	0.0
•	·	•	•	•	•	•		•		•	•	•	•
•	•	·	•	•	•	•			-		,	•	•
·	•		•	•	•	•			•	•	•	•	•
•	•	•	•	•	•	•			•	•	•	•	•
•		•	•	•	•	•		•		•	•	•	•
•	•		•	•	•	•				•	•	•	•
·		•	•	•	•	•		•		•	•	•	•
•	•	•	•	•	•	•		•		•	•	•	•
•	•	•	•	•	•	•					•	•	•
•	,		•	٠	•	•		•			•	•	•
·	•	•	•	•	•	•		•		•	•	•	•
•	•	•	•	•	•	•		•		•	•	•	•
•	•	•	•	•	•	•				•	•	•	•
•	•	•	•	•	•	•		•		•	•	•	•
	·	•	•	•	•	•		•		•	•	•	•
1,046	3 0.6	•	•	•	•	•		•		•	•	1,046	9.0
•	•	•	•	•	•	•		•		•	•	•	•
429	9 0.1		•	•	•	•				•	•	429	0.1
P 205A			•	•	•	•		•			•	•	
•	•	•	•	•	•	•		1			•	•	•
413	3 0.1	•	•	•	•			•			•	413	0.1
P 207A		•	,	•	•	•		•			•	•	
413	3 0.1	•	•	•	•	•		•		•	•	413	0.1
P 208A	•	•	•	•	•	•		•		•	•	•	
1,831	1.7		•	•	•	•		•		•	•	1,831	1.7
•		•	•	•	•	•		•		•	•	•	•
•	•	•	•	•	•	•		•		•	•	•	
•		•	•	•	•	•		•		•	•	•	
•	•	•	•	•	•	•		•		•	•	•	
413	3 0.1	•	•	•	•	•				•	•	413	0.1
•	•	•	•	•	•	•			•	•	•	•	•
413	3 0.1	•	•	•	•	•		•	•	•	•	413	0.1
P 230A	•	•	•	•	•	•		•	•	•	•	•	•

ECO D-4 REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: SUMMARY OF TOTAL PROJECT

No. Energy Savings En	Fac	SIR > 1.0 D4A	_	SIR > 1.0 D4B	D4B	SIR > 1.0 D4C	.0 D4C	SIR >	SIR > 1.0 D4D	SIR	SIR > 1.0 D4E	SIR >	SIR > 1.0 D4F	SIR > 1	SIR > 1.0 D4 AII
89 0.0 - 836 0.5 - 849 0.1	Ö	Energy Saving kWH/Y kW De	gs emand	Energy St kWH/Y K	wings W Demand	Energy kWH/Y	Savings kW Demand	Energy 1 kWH/Y	y Savings ′kW Deman	Ene!	rgy Savings I/Y kW Deman	Energide KWHA	Energy Savings kWH/Y kW Demand	Energy d kWH/Yr	Energy Savings kWH/Yr kW Deman
89 0.0	S 236	•	'	•	•	•	'	ľ			1				
89 0.0	S 237	•	•	•	•	•	•	٠	•		•	•	•	•	
89 0.0	S 238	•	•	•	•	•	•	7,286		,_	•	•	•	7,286	3.5
89 0.0	P 240	•	•	•	•	•	•	•	•		•	•	•	•	
89 0.0 836 0.5	S 241	•	•	•	•	٠	•	•					•		
89 0.0 - 208 0.1 - 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	S 243	•	•	•	•	•	•	•	•				•	•	
89 0.0 - 208 0.1 - 936 0.5	S 244		•	•	•	•	•	•			•		•		
89 0.0 208 0.1 836 0.5 1	S 246	•	•	•	•	•	•	•		,		•		•	
89 0.0 - 208 0.1 - 636 0.5	S 247		•	•	•	•	•	•			•		•		
89 0.0 - 208 0.1 636 0.5 -	P 252	68	0.0	•	•	•	,	•		3,5	38 1.7		•	3,628	-
89 0.0	P 256	•	•	208	0.1	•	•	•			193 0.2	വ	•	. 28	0.3
161 0.1 936 0.5 936 1.2 936 1.2 936 1.2 936 1.2 936 1.2	P 259	83	0.0	•	•	•	•			9,6	1.9	O	•	4,021	1.9
161 0.1	S 283	•	•	•	•	936	0.5	•					•	- 836	0.5
161 0.1	S 286		•	•	•	•	•	•			•				
161 0.1	P 287	•	•	•	•	•	•	•			•				
161 0.1	S 288		•	•	•	•	•	,					•		
5,409 1.2	S 290	•	•	•	•	•	•	•			•	•			
5,409 1.2	S 291	161	0.1	•	•	•	•	•			•	•	•	. 161	0.1
22,623 7.8 208 0.1 4,922 2.0 7,286 3.5	P 295	5,409	1.2	•	•	•	•	•			•		•	- 5,409	1.2
22,623 7.8 208 0.1 4,922 2.0 7,286 3.5	P 301	•	•	•	•	•	•	•			•	•			
22,623 7.8 208 0.1 4,922 2.0 7,286 3.5	P 642		•	•	•	•	•				•	•	•		
22,623 7.8 208 0.1 4,922 2.0 7,286 3.5	S 2201	•	•	•	•	•	•	•			•		•		
	TOTALS	22,623	7.8	208	0.1	4,922	2.0	1		ı	62 3.8	8 4,124	5.5	5 47,025	22.7

ECO D-4A REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 160 W to 13W/5T4

Fac	A: 1-6	A: 1-60W Savings										
Š) - :	Energy Savings	ings			O&M	LCC Savings	LCC Savings Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs	kWH/Yr	kW Demand	Use \$/Yr	Demand \$/Yr	\$/Yr	₩.	\$	₩	₩	\$	
1 e	5	376	4.0	\$28	\$47	\$14.85	\$1,039	\$1,170	\$1,304	\$150	\$1,154	0.30
P 41A	0	0	0.0	\$0	\$	\$0.00	\$0					
P 41B	0	0	0.0	\$	\$	\$0.00	\$0					
P 42A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 42B	0	0	0.0	\$	\$	\$0.00	\$0					
P 43A	0	0	0.0	\$	\$	\$0.00	\$0					
P 43B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 44A	0	0	0.0	\$0	0\$	\$0.00	\$0					
P 44B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 45A	0	0	0.0	\$0	\$0	\$0.00	\$					
P 45B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 46	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 47	0	0	0.0	\$	\$0	\$0.00	\$0					
P 51A	0	0	0.0	\$	\$ 0	\$0.00	\$0					
P 51B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 52A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 52B	0	0	0.0	\$	\$0	\$0.00	\$0					
P 53	o	0	0.0	\$0	\$0	\$0.00	\$0					
P 54	0	0	0.0	\$	\$0	\$0.00	\$0					
P 55	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 56	0	0	0.0	Ş	\$0	\$0.00	\$0					
P 57	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 58	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 59	0	0	0.0	\$0\$	\$0	\$0.00	\$0					
P 60	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 79	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 80	-	19	0.0	₩	\$	\$0.74	\$19	\$117	\$130	\$15	\$115	0.69
P 81	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 101	212	2,986	9.1	\$223	066\$	\$118.07	\$15,500	\$24,802	\$27,654	\$3,180	\$24,474	0.63
P 116	0	0	0.0	\$0	\$0	\$0.00	\$0					•
T 120	6	1,803	0.4	\$134	\$42	\$71.29	\$2,857	\$1,053	\$1,174	\$135	\$1,039	2.75
T 121	8	250	0.1	\$19	6\$	\$9.90	\$438	\$234	\$261	\$30	\$231	1.90
T 124	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 127	2	2,892	6.0	\$216	\$98	\$114.35	\$4,942	\$2,457	\$2,739	\$315	\$2,424	2.04
P 128	20	6,887	2.2	\$513	•	\$272.27	\$11,766	\$5,849	\$6,522	\$750	\$5,772	20.04
T 131	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 144	36	0	5.7	\$0	\$168	\$0.00	\$1,967	\$4,212	\$4,696	\$540	\$4,156	0.47
					1						ţ	

ECO D-4A REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 160 W to 13W/5T4

						•	1			!
				O&M	LCC Savings	LCC Savings Construction	Total Cost	Rebate	Investment	SIR
mand	kWH/Yr kW Demand Use \$/Yr	- 1	Demand \$/Yr	\$∕⊀	₩.	₩	₩	••	€9	
0.0		\$0	0\$	\$0.00	0\$					
4.0	₩	\$28	\$47	\$14.85	\$1,039	\$1,170	\$1,304	\$150	\$1,154	0.90
0.0		\$6	\$2	\$3.18	\$160		\$130	\$15	\$115	1.39
0.0		\$	\$	\$0.00	\$0					
0.0		\$0	\$	\$0.00	\$0					
0.0		Ç\$	\$	\$0.00	\$0					
0.0		0 \$	₽	\$0.00	\$0					
0.0		\$0	\$	\$0.00	\$0					
0.0		\$0	\$	\$0.00	\$0					
0.0		\$0	₽	\$0.00	\$0					
0.0		\$0	S	\$0.00						
0.0		\$0	\$	\$0.00						
0.0		\$0	\$	\$0.00						
0.0		\$0	\$	\$0.00					**	
0.0		\$0	9	\$0.00	\$0					
0.0		\$0	\$	\$0.00						
0.0		\$0	\$	\$0.00	0					
0.5		\$6	\$19	\$3.22			\$522	\$60	\$462	_
9.0	-5	\$78	\$61	\$41.37	\$2,083	\$1,521	\$1,696	\$195	\$1,501	1.39
0.0		\$	S S	\$0.00	\$0					
0.1		\$32	\$14	\$16.97	₩	\$351	\$391	\$45	\$346	2.10
0.0		\$	\$0	\$0.00						
0.0		\$0	\$	\$0.00	\$					
0.1		\$31	\$14	\$16.34	₩	\$351	\$391	\$45	\$346	2.04
0.0		Q	\$0	\$0.00						
0.1	- 4	\$31	\$14	\$16.34	G	\$351	\$391	\$45	\$346	2.04
0.0		Q	\$0	\$0.00						
1.7	₩	\$137	\$182	\$72.40	\$4,6	\$4,563	\$5,087	\$282	\$4,502	1.01
0.0		\$0	₽	\$0.00						
0.0		\$0	\$	\$0.00	\$0					
0.0		\$0	\$	\$0.00	0\$					
0.0		\$0	\$	\$0.00	0\$ 0					
0.1		\$31	\$14	\$16.34	\$ \$706	\$ \$351	\$391	\$45	\$346	2.04
0.0		\$	\$0	\$0.00	\$0					
0.1	. •	\$31	\$14	\$16.34	₩.	\$ \$351	\$391	\$45	\$346	2.04
0.0		80	\$ 0	\$0.00	0\$					
0		•								

ECO D-4A REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 160 W to 13W/5T4

No. Energy S 236 0 237 0 240 0 241 0 244 0 245 0 245 0 245 0 245 0 245 0 245 0	Demand					•	(:			
Extrs 236 0 237 0 240 0 244 0 245 0 245 245 252 1				S S S	O&M LCC Savings Construction	Construction	lotal Cost	Hebate	Investment	SE
236 0 237 0 240 0 241 0 243 0 244 0 245 0		Use \$/Yr Demand \$/Yr	and \$/Yr	\$/Yr	, 69	⇔	⇔	₩	₩	
237 0 240 0 241 0 243 0 244 0 245 0	0.0	\$0	\$	\$0.00	0\$					
238 0 241 0 241 0 243 0 244 0 245 0	0.0	\$0	\$	\$0.00	\$0					
240 0 243 0 244 0 245 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0	\$0	\$	\$0.00	0\$					
241 0 243 0 244 0 246 0 247 0	0.0	\$ 0	9	\$0.00	\$					
243 0 244 0 246 0 247 0 0 252 1	0.0	\$0	9	\$0.00	0\$					
244 0 246 0 247 0	0.0	\$0	0 \$	\$0.00	\$0					
246 0 247 0 252 1	0.0	\$0	\$0	\$0.00	0\$					
247 0 252 1	0.0	\$0	\$0	\$0.00	0\$					
252 1	0.0	\$0	\$	\$0.00	\$0					
	0.0	25	₩	\$3.54	\$172	\$117	\$130	\$15	\$115	1.49
P 256 0 0	0.0	\$0	\$	\$0.00	\$0		•	•	•	!
P 259 1 89	0.0	22	\$	\$3.54	\$172	\$117	\$130	\$15	\$115	1.49
S 283 0 0	0.0	0\$	\$	\$0.00	\$0					
S 286 0 0	0.0	\$0	\$0	\$0.00	\$0					
P 287 8 338	0.3	\$25	\$37	\$13.37	\$881	\$936	\$1,044	\$120	\$924	0.95
S 288 0 0	0.0	0	\$	\$0.00	\$0		•			
S 290 0 0	0.0	0\$	\$	\$0.00	\$					
S 291 2 161	0.1	\$12	6	\$6.36	\$320	\$234	\$261	\$30	\$231	1.39
P 295 27 5,409	1.2	\$403	\$126	\$213.86	\$8,571	\$3,159	\$3,522	\$405	\$3,117	2.75
P 301 0 0	0.0	\$0	\$	\$0.00	\$0		•		•	
P 642 0 0	0.0	\$0	\$0	\$0.00	\$0					
S 2201 0 0	0.0	\$0	\$	\$0.00	\$0					
TOTALS 181 22,623	89	\$1,686	\$845	\$894	\$39,564	\$21,175	\$23,610	\$2,715	\$20,895	1.89
TOTALS ONLY FOR BUILDINGS WI	BUILDINGS	WITH SIR's OVER 1.0	VER 1.0							

ECO D-4B REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 175 W to 18W/774

No. Emergy Sewings Sew	Š	-								,			
Fixes With Principal Uses S/Y Dammard S/Y SYY SY SY SY SY SY SY			Energy Sav	ings			Š	LCC Savings C	onstruction	Total Cost	Rebate	Investment	SIB
		Fxtrs	KWH/Yr	kW Demand	Use \$/Yr	Demand \$/Yr	\$∕Xr	ક	↔	₩	€9	49	
A		0	0	0.0	\$	\$	\$0.00	0\$					
No. 10		0	0	0.0	\$	\$0	\$0.00	9					
	P 41B	0	0	0.0	Ş	0\$	\$0.00	9					
No. Color		0	0	0.0	\$	\$0	\$0.00	S					
A		0	0	0.0	\$	\$ 0	\$0.00	0 \$					
1		0	0	0.0	Ç	\$0	\$0.00	8					
8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8		0	0	0.0	\$	\$0	\$0.00	0\$					
No. Color		0	0	0.0	Ş	\$	\$0.00	9					
	P 44B	0	0	0.0	Q	\$0	\$0.00	9					
3	P 45A	0	0	0.0	Ş	\$0	\$0.00	0					
No. No.	P 45B	0	0	0.0	Ç\$	\$0	\$0.00	0\$					
No. Color	P 46	0	0	0.0	\$	\$	\$0.00	0 \$					
A	P 47	0	0	0.0	Ç.	\$	\$0.00	\$0					
A 0 0 50 <td></td> <td>0</td> <td>0</td> <td>0.0</td> <td>Q</td> <td>0\$</td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>		0	0	0.0	Q	0\$	\$0.00	\$0					
8		0	0	0.0	Ş	0\$	\$0.00	\$					
3 0 0.0 \$0 </td <td></td> <td>0</td> <td>0</td> <td>0.0</td> <td>Ş</td> <td>\$</td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>		0	0	0.0	Ş	\$	\$0.00	\$0					
0 0.0 \$0<		0	0	0.0	Ş	0\$	\$0.00	\$0					
0 0 0 0 0 80 80 80 80 80 80 80 80 80 80	ន		0	0.0	Ş	\$0	\$0.00	\$0					
0 0 0 0 0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0		0	0	0.0	\$ 0	0\$	\$0.00	\$0					
0 0 0 0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0		0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0 0.0 \$0 </td <td></td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$</td> <td>\$0</td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>		0	0	0.0	\$	\$0	\$0.00	\$0					
0 0 0.0 \$0 \$0.00 \$0 \$0.00 \$0 0 0 0.0 \$0	P 57	0	0	0.0	\$	\$	\$0.00	\$0					
0 0 0.0 \$0 </td <td>P 58</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$</td> <td>0\$</td> <td>\$0.00</td> <td>0\$</td> <td></td> <td></td> <td></td> <td></td> <td></td>	P 58	0	0	0.0	\$	0\$	\$0.00	0\$					
0 0 0 50 \$0 <td>P 59</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$0</td> <td>\$0</td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>	P 59	0	0	0.0	\$0	\$0	\$0.00	\$0					
12 98 0.0 \$0 <t< td=""><td>P 60</td><td>0</td><td>0</td><td>0.0</td><td>\$0</td><td>\$0</td><td>\$0.00</td><td>O\$</td><td></td><td></td><td></td><td></td><td></td></t<>	P 60	0	0	0.0	\$0	\$0	\$0.00	O\$					
0 0 \$0 \$0 \$0 \$0 \$1,385 <td>S 79</td> <td></td> <td>0</td> <td>0.0</td> <td>\$0</td> <td>\$0</td> <td>\$0.00</td> <td>\$</td> <td></td> <td></td> <td></td> <td></td> <td></td>	S 79		0	0.0	\$0	\$0	\$0.00	\$					
12 98 0.6 \$7 \$65 \$5.31 \$907 \$1,404 \$1,565 \$1,385 1 0 0 0 0 \$0	P 80	0	0	0.0	\$ 0	\$0	\$0.00	\$0					
00 0 0.0 \$0 \$0.00 \$0 00 0 0 0 0 0 0 0 0 0 00 0 0 0 0	P 81	12	88	9.0	\$7	\$65	\$5.31	206\$	\$1,404	\$1,565	\$180	\$1.385	0.65
116 0 0 0.0 \$0 \$0 120 0 0.0 \$0 \$0 \$0 121 0 0 0.0 \$0 \$0 \$0 124 0 0 0 \$0 \$0 \$0 127 0 0 0 \$0 \$0 \$0 128 0 0 0 \$0 \$0 \$0 131 0 0 0 \$0 \$0 \$0 144 0 0 0 \$0 \$0 \$0	P 101	0	0	0.0	\$0	\$0	\$0.00	\$0		•			
120 0 0 0.0 \$0 \$0 121 0 0 0.0 \$0 \$0 \$0 124 0 0 0 \$0 \$0 \$0 127 0 0 0 \$0 \$0 \$0 128 0 0 0 \$0 \$0 \$0 131 0 0 0 \$0 \$0 \$0 144 0 0 0 \$0 \$0 \$0	P 116	0	0	0.0	\$0	\$0	\$0.00	\$0					
121 0 0 0.0 \$0 \$0 \$0 124 0 0 0.0 \$0 \$0 \$0 127 0 0 0.0 \$0 \$0 \$0 128 0 0 0 \$0 \$0 \$0 131 0 0 0 \$0 \$0 \$0 144 0 0 0 \$0 \$0 \$0	T 120	0	0	0.0	\$	\$0	\$0.00	\$0					
124 0 0 0 \$0 \$0 127 0 0 0 \$0 \$0 128 0 0 0 \$0 \$0 131 0 0 0 \$0 \$0 144 0 0 0 0 \$0	T 121	0	0	0.0	\$	\$0	\$0.00	0\$					
127 0 0 0 \$0 \$0 \$0 128 0 0 0 \$0 \$0 \$0 131 0 0 0 \$0 \$0 \$0 144 0 0 0 0 \$0 \$0	T 124	0	0	0.0	\$	\$0	\$0.00	\$0					
128 0 0 0.0 \$0 \$0.00 131 0 0 0.0 \$0 \$0 \$0.00 144 0 0 0.0 \$0 \$0 \$0.00		0	0	0.0	\$	\$0	\$0.00	\$					
00.0\$ 0\$ 0.0 0 0 00.0\$ \$0 \$0.00		0	0	0.0	9	\$0	\$0.00	\$0					
00.0\$ 0\$ 0.0 0 0	r 131	0	0	0.0	Q	\$0	\$0.00	\$0					
	5 144	0	0	0.0	9	0\$	\$0.00	\$0					

ECO D-4B REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 175 W to 18W/7T4

Fac	B: 1-7	B: I-75W Savings										
ò	_	Energy Savings	ngs			O&M	LCC Savings	LCC Savings Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs	kWH/Yr	kW Demand	Use \$/Yr	Demand \$/Yr	\$/Yr	\$	₩	₩	49	€	
S 146	0	0	0.0	\$	0\$	\$0.00	\$0					
T 149	0	0	0.0	₩	\$0	\$0.00	0\$					
T 158	0	0	0.0	₩		\$0.00	\$0					
T 158	0	0	0.0	\$	\$0	\$0.00	\$0					
T 161	0	0	0.0	\$	\$0	\$0.00	\$0					
T 162	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 163	0	0	0.0	\$	\$0	\$0.00	\$0					
T 164	0	0	0.0	\$		\$0.00	\$0					
T 165	0	0	0.0	\$		\$0.00	\$0					
T 166	0	0	0.0	\$		\$0.00	\$0					
T 167	0	0	0.0	₩		\$0.00	\$0					
S 168	0	0	0.0	₩		\$0.00	\$					
T 172	0	0	0.0	₩		\$0.00	\$0					
P 177	0	0	0.0	₩		\$0.00					ir ±	
P 178	0	0	0.0	₩		\$0.00						
S 182	0	0	0.0	\$		\$0.00	\$0					
S 186	0	0	0.0	\$		\$0.00	\$0					
P 190	17	402	6.0	\$30	\$92	\$21.72	\$1,672	\$1,989	\$2,218	\$255	\$1,963	0.85
S 197	0	0	0.0	\$	\$0	\$0.00	\$0					
S 198	0	0	0.0	\$	\$0	\$0.00	\$0					
P 205	0	0	0.0	\$0		\$0.00	0 \$					
P 205A	0	0	0.0	\$	\$00	\$0.00	0 \$					
P 206	0	0	0.0	\$		\$0.00	\$					E
P 207	0	0	0.0	\$	0\$	\$0.00	\$0					œ
P 207A	0	0	0.0	₩	\$0	\$0.00	\$					>
P 208	0	0	0.0	\$		\$0.00						1
P 208A	0	0	0.0	₩		\$0.00						14
P 209	0	0	0.0	₩		\$0.00						-
P 210	0	0	0.0	₩		\$0.00						3
P 211	0	0	0.0	\$	\$0	\$0.00						H
P 212	0	0	0.0	\$	\$0	\$0.00						Ε£
P 219	0	0	0.0	\$	\$0	\$0.00	0\$					· T
P 229	0	0	0.0	\$	\$0	\$0.00						1
P 229A	0	0	0.0	\$0	\$0	\$0.00						a
P 230	0	0	0.0	\$	\$00	\$0.00						0
P 230A	0	0	0.0	\$		\$0.00	\$0					F
S 235	0	0	0.0	\$	\$0	\$0.00						3

ECO D-4B REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 175 W to 18W/7T4

Fac	B: 1-7;	B: I-75W Savings										
2		Energy Savings	<u>s</u>			O&M	O&M LCC Savings Construction	Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs	KWH/Yr KM	kW Demand	Use \$/Yr	Demand \$/Yr	\$∕Yr	€	₩	49	₩	69	
\$ 236	0	0	0.0	0\$	\$	\$0.00						
S 237	0	0	0.0	\$0	\$0	\$0.00						
S 238	0	0	0.0	\$	\$0	\$0.00						
P 240	0	0	0.0	\$0	\$	\$0.00						
S 241	0	0	0.0	\$0	\$	\$0.00	9					
S 243	0	0	0.0	\$	\$0	\$0.00						
S 244	0	0	0.0	\$0	\$0	\$0.00	0\$					
S 246	0	0	0.0	\$0	\$0	\$0.00						
S 247	0	0	0.0	\$	\$	\$0.00						
P 252	0	0	0.0	₩	0\$	\$0.00	\$0					
P 256	~	208	0.1	\$16	\$11	\$11.23	\$433	\$234	\$261	\$30	\$231	1.88
P 259		0	0.0	\$	\$	\$0.00	\$0					
S 283	0	0	0.0	\$	\$0	\$0.00	\$0					
S 286	0	0	0.0	\$0	\$0	\$0.00					** -	
P 287	0	0	0.0	\$0	\$0	\$0.00						
S 288	0	0	0.0	\$0	\$0	\$0.00						
S 290	0	0	0.0	\$	\$0	\$0.00	0\$					
S 291	o	0	0.0	\$0	0\$	\$0.00						
P 295	0	0	0.0	\$0	\$0	\$0.00						
P 301	0	0	0.0	\$0	\$0	\$0.00						
P 642	0	0	0.0	\$0	\$0	\$0.00	\$0					
\$ 2201	0	0	0.0	\$0	\$0	\$0.00						
TOTALS	2	208	0	\$16	\$11	\$11	\$433	\$234	\$261	\$30	\$231	1.88
	TOTAL	TOTAL SONI Y FOR RITH DINGS WITH		S WITH OIL	Signal Control of the			•		•	į	

ECO D-4C REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1100 W to 18W/7T4

Fac	Ö	C: I-100W Savings	St									
ò		Energy Savings	ings			08M	LCC Savings	LCC Savings Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs	kWH/Yr	kW Demand	Use \$/Yr	Demand \$/Yr	\$/∀r	₩	69	↔	₩	υ	
T 6	Q	131	0.2	\$10	\$16	\$5.88	\$370	\$234	\$261	\$30	\$231	1.60
P 41A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 41B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 42A	0	0	0.0	\$0	\$	\$0.00	\$0					
P 42B	0	0	0.0	\$	\$0	\$0.00	\$0					
P 43A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 43B	0	0	0.0	\$	\$0	\$0.00	\$0					
P 44A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 44B	0	0	0.0	\$0	\$0	\$0.00	0\$					
P 45A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 45B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 46	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 47	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 51A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 51B	0	0	0.0	\$	\$0	\$0.00	\$0					
P 52A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 52B	0	0	0.0	\$	\$0	\$0.00	0 \$					
	0	0	0.0	\$	\$0	\$0.00	\$0					
P 54	0	0	0.0	\$	\$	\$0.00	\$0					
P 55	0	0	0.0	\$	\$0	\$0.00	\$0					
P 56	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 57	0	0	0.0	\$	\$0	\$0.00	\$0					
	0	0	0.0	\$	\$0	\$0.00	\$0					
P 59	0	0	0.0	\$	\$0	\$0.00	0 \$				•	
	0	0	0.0	\$	0\$	\$0.00	\$ 0					
S 79	0	0	0.0	₽	\$0	\$0.00	\$0					
P 80	က	86	0.2	25	\$24	\$4.41	\$421	\$351	\$391	\$45	\$346	1.21
	0	0	0.0	Ģ	\$0	\$0.00	\$0					
P 101	0	0	0.0	\$	\$0	\$0.00	\$0					,,
P 116	0	0	0.0	\$	\$0	\$0.00	\$0					
T 120	-	349	0.1	\$26	\$8	\$15.69	\$574	\$117	\$130	\$15	\$115	4.98
T 121	-	218	0.1	\$16	\$8	\$9.80	\$395	\$117	\$130	\$15	\$115	3.42
T 124	0	0	0.0	\$0		\$0.00	\$0					
T 127	5	3,123	1.0	\$233	₩	\$140.19	\$5,522	\$1,521	\$1,696	\$195	\$1,501	3.68
P 128	0	0	0.0	\$		\$0.00	\$0					
T 131	0	0	0.0	\$0	\$0	\$0.00	\$0					-
S 144	0	0	0.0	Q	1	\$0.00	\$0			:		•

ECO D-4C REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1100 W to 18W/714

Fac	Ö	C: I-100W Savings										
o N	_	Energy Savings				O&M	LCC Savings Construction	Construction	Total Cost	Rebate	Investment	SIB
	Fxtrs	kWH/Yr kW	kW Demand	Use \$/Yr	Demand \$/Yr	\$/∀r	G	₩	₩	₩	49	
S 146	0	0	0.0	Q	\$0	\$0.00	\$0					
T 149	_	99	0.1	\$5	\$8	\$2.94	\$185	\$117	\$130	\$15	\$115	9.
T 158	0	0	0.0	\$	\$	\$0.00	\$					
T 158	0	0	0.0	\$0	\$0	\$0.00	\$					
T 161	0	0	0.0	\$	\$0	\$0.00	0\$					
T 162	0	0	0.0	0\$	\$0	\$0.00	\$					
T 163	0	0	0.0	\$	\$0	\$0.00	\$0					
T 164	0	0	0.0	0	\$0	\$0.00	\$0					
T 165	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 166	0	0	0.0	\$0	\$0	\$0.00	\$0					
T 167	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 168	0	0	0.0	\$	\$0	\$0.00	\$0					
T 172	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 177	0	0	0.0	\$	\$0	\$0.00	\$0				ár ú	
P 178	0	0	0.0	\$	\$0	\$0.00	\$0					
S 182	0	0	0.0	\$	\$0	\$0.00	\$0					
S 186	0	0	0.0	⊗	\$0	\$0.00	\$0					
	0	0	0.0	\$	\$0	\$0.00	\$0					
S 197	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 198	0	0	0.0	\$0	\$0	\$0.00	\$					
P 205	0	0	0.0	\$	\$0	\$0.00	\$0					
P 205A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 206	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 207	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 207A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 208	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 208A	0	0	0.0	Ş	\$	\$0.00	\$0					
P 209	0	0	0.0	\$	\$0	\$0.00	\$0					
P 210	0	0	0.0	\$	\$0	\$0.00	\$0					
P 211	0	0	0.0	\$0	\$	\$0.00	\$0					
P 212	0	0	0.0	\$0	Q	\$0.00	\$					
P 219	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 229	0	0	0.0	\$ 0	\$ 0	\$0.00	\$0					
P 229A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 230	0	0	0.0	\$0	\$ 0	\$0.00	\$0					
	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 235	0	0	0.0	\$ 0	\$0	\$0.00	\$0					

ECO D-4C REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1100 W to 18W/7T4

Fac	i E	C: I-100W Savings	sf									
ŏ.		Energy Savings	ings			0&M	O&M LCC Savings Construction	Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs	kWH/Yr	kWH/Yr kW Demand	Use \$/Yr	Demand \$/Yr	\$∕⊀	₩	₩	₩	€9	4	
\$ 236	0	0	0.0	\$0	\$0	\$0.00	\$					
S 237	0	0	0.0	\$	\$0	\$0.00	\$0					
S 238	0	0	0.0	\$	\$0	\$0.00	\$0					
P 240	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 241	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 243	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 244	0	0	0.0	\$	\$0	\$0.00	\$0					
S 246	0	0	0.0	\$	\$0	\$0.00	\$0					
S 247	0	0	0.0	₽	\$0	\$0.00	\$0					
P 252	0	0	0.0	\$	\$0	\$0.00	\$0					
P 256	0	0	0.0	₩	\$0	\$0.00	\$0					
P 259		0	0.0	\$	\$0	\$0.00	\$0					
S 283	9	986	0.5	\$20	\$49	\$42.02	\$1,855	\$702	\$783	06\$	\$693	2.68
S 286	0	0	0.0	\$	\$0	\$0.00	\$0					
P 287	0	0	0.0	₩	\$0	\$0.00	\$0					
S 288	0	0	0.0	\$	\$	\$0.00	\$0					
S 290	0	0	0.0	\$0	\$	\$0.00	\$0					
S 291	0	0	0.0	\$	\$0	\$0.00	\$0					
P 295	0	0	0.0	\$	\$0	\$0.00	\$0					
P 301	0	0	0.0	\$	\$0	\$0.00	\$0					
P 642	0	0	0.0	\$		\$0.00	\$0					
S 2201	0	0	0.0	\$0	\$0	\$0.00	\$0		:			
TOTALS	27	4,922	2	\$367		\$221	\$9,322	\$3,159	\$3,522	\$405	\$3,117	2.99
	TOTA	LS ONLY F	TOTALS ONLY FOR BUILDINGS WI		TH SIR's OVER 1.0							

ECO D-4D REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1150 W to 26W/8T4

Fac	D: 1-150W Savings	V Savings										
ě	Ene	Energy Savings	Ø			O&M L	LCC Savings Construction	struction	Total Cost	Rebate	Investment	SIR
	Fxtrs K	KWH/Yr KW	kW Demand	Use \$/Yr	Demand \$/Yr	\$/Yr	ક	↔	မှ	₩	ь	
T 6	0	0	0.0	\$0	0\$	\$0.00	0\$					
P 41A	0	0	0.0	\$0	\$	\$0.00	0 \$					
P 41B	0	0	0.0	\$	0\$	\$0.00	0\$					
P 42A	0	0	0.0	\$0	\$	\$0.00	9					
P 42B	0	0	0.0	\$0	0\$	\$0.00	0					
P 43A	0	0	0.0	\$0	0\$	\$0.00	0\$					
P 43B	0	0	0.0	\$0	\$	\$0.00	0\$					
P 44A	0	0	0.0	0\$	\$	\$0.00	\$0					
P 44B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 45A	0	0	0.0	\$	\$	\$0.00	0\$					
P 45B	0	0	0.0	\$0	0 \$	\$0.00	\$					
P 46	0	0	0.0	\$0	\$0	\$0.00	O\$					
P 47	0	0	0.0	\$0	\$ 0	\$0.00	O\$					
P 51A	0	0	0.0	Q	\$ 0	\$0.00	⊙				t Ωr +_	
P 51B	0	0	0.0	\$0	O\$	\$0.00	0\$					
P 52A	0	0	0.0	\$	0\$	\$0.00	\$0					
P 52B	0	0	0.0	Ç,	Q	\$0.00	O\$					
P 53	o 	0	0.0	\$ 0	\$	\$0.00	0\$					
P 54	0	0	0.0	S S	9	\$0.00	\$0					
P 55	0	0	0.0	\$0	9	\$0.00	0\$					
P 56	0	0	0.0	\$	9	\$0.00	0\$					
P 57	0	0	0.0	0 \$	\$	\$0.00	\$ 0					
P 58	0	0	0.0	Q	\$0	\$0.00	\$0					
P 59	0	0	0.0	\$	\$0	\$0.00	\$0					
P 60	0	0	0.0	\$0	0\$	\$0.00	\$ 0					
S 79	0	0	0.0	0\$	\$	\$0.00	\$0					
P 80	0	0	0.0	\$0	\$	\$0.00	\$0					
P 81	0	0	0.0	Q \$	0\$	\$0.00	\$0					
P 101	0	0	0.0	Q \$	\$	\$0.00	\$0					
P 116	0	0	0.0	\$0	\$	\$0.00	O\$					
T 120	0	0	0.0	\$0	\$	\$0.00	\$					
T 121	0	0	0.0	\$	\$0	\$0.00	\$0					
T 124	0	0	0.0	\$0	\$0	\$0.00	0 \$					
T 127	0	0	0.0	\$0	\$	\$0.00	0\$					
P 128	0	0	0.0	\$0	0 \$	\$0.00	0\$					
T 131	0	0	0.0	\$0	0\$	\$0.00	\$					
S 144	0	0	0.0	\$0	\$0	\$0.00	\$0					

ECO D-4D REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1150 W to 26W/8T4

Fac	ä	D: I-150W Savings	S									
ŏ		Energy Savings	ings			O&M		LCC Savings Construction	Total Cost	Rebate	Investment	ä
	Fxtrs	kWH/Yr	kW Demand	Use \$/Yr	\$/Yr Demand \$/Yr	\$/Yr		₩	(9	49	θ	<u>.</u>
S 146	0	0	0.0	₩	\$0	\$0.00	0\$					
T 149	0	0	0.0	\$0	\$ 0	\$0.00	\$0					
T 156	0	0	0.0	\$	\$ 0	\$0.00	\$0					
T 158	က	0	0.3	\$	\$37	\$0.00	\$431	\$487	\$543	\$45	\$498	0.87
T 161	0	0	0.0	\$0	80	\$0.00	0\$			<u>}</u>		5
T 162	0	0	0.0	\$0	\$0	\$0.00	\$					
T 163	0	0	0.0	\$	\$0	\$0.00	₩					
T 164	0	0	0.0	\$	\$0	\$0.00	. ₩					
T 165	0	0	0.0	\$	0\$	\$0.00	0 \$					
T 166	0	0	0.0	\$	\$0	\$0.00	\$0					
	0	0	0.0	\$	\$0	\$0.00	\$0					
S 168	-	0	0.1	\$	\$12	\$0.00	\$144	\$162	\$181	\$15	\$166	0.87
	0	0	0.0	\$0	\$0	\$0.00	\$0			•	•	
	0	0	0.0	\$	0 \$	\$0.00	\$0					
	0	0	0.0	\$0	\$0	\$0.00	\$					
	0	0	0.0	\$0	\$0	\$0.00	\$0					
	0	0	0.0	\$	\$0	\$0.00	\$					
	0	0	0.0	\$0	\$0	\$0.00	\$0					
S 197	0	0	0.0	\$0	\$0	\$0.00	0\$					
S 198	0	0	0.0	\$	\$0	\$0.00	\$0					
P 205	0	0	0.0	\$0	\$0	\$0.00	0\$					
P 205A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 206	0	0	0.0	\$0	\$0	\$0.00	\$					
P 207	0	0	0.0	\$	\$0	\$0.00	0\$					
P 207A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 208	0	0	0.0	\$0	\$0	\$0.00	\$0					,
P 208A	0	0	0.0	\$0	0\$	\$0.00	\$0					
P 209	0	0	0.0	\$0	\$0	\$0.00	\$0					•
P 210	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 211	0	0	0.0	\$0	\$0	\$0.00	\$0					<i>.</i>
P 212	0	0	0.0	\$ 0	\$0	\$0.00	\$0					•
P 219	0	0	0.0	Ş	\$	\$0.00	\$0					-
P 229	0	0	0.0	₽	\$	\$0.00	\$0					
P 229A	0	0	0.0	\$0	\$	\$0.00	\$0					,
P 230	0	0	0.0	\$0	\$	\$0.00	\$0					,
	0	0	0.0	\$0	\$	\$0.00	\$0					57
S 235	0	0	0.0	\$0	\$ 0	\$0.00	\$0					

ECO D-4D REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1150 W to 26W/8T4

Fine gy Seavings Fine gy Seavings C&M LCC Savings Construction Total Cost Rebate Rebate Investigation (No. 1) Total Cost Rebate Investigation (No. 1) Cost (No. 1) <	Š			2									
Extrs kWH/fyr kW Demand Lose \$f/Yt Demand \$f/Yt Store \$6			Energy Sav	ings			O&M	LCC Savings	Construction	Total Cost	Rebate	Investment	
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		Fxtrs	- 1	kW Demand	Use \$/Yr	Demand \$/Yr		49	₩	₩	₩	₩	
0 0 50 <td>3 236</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$0</td> <td>0\$</td> <td>\$0.00</td> <td>0\$</td> <td></td> <td></td> <td></td> <td></td> <td>1</td>	3 236	0	0	0.0	\$0	0\$	\$0.00	0\$					1
31 7,286 3.5 \$543 \$219.23 \$13,243 \$5,029 \$5,607 \$465 \$5 0 0 0.0 \$0 \$0 \$0 \$0 \$6 \$0 \$6 <td< td=""><td>3 237</td><td>0</td><td>0</td><td>0.0</td><td>\$</td><td>\$0</td><td>\$0.00</td><td>\$0</td><td></td><td></td><td></td><td></td><td></td></td<>	3 237	0	0	0.0	\$	\$0	\$0.00	\$0					
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		31	7,286	3.5	\$543	\$380	\$219.23	\$13,243	\$5,029	\$5,607	\$465	\$5,142	
1	240	0	0	0.0	\$	0\$	\$0.00	\$0					
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0	0	0.0	\$	\$0	\$0.00	\$0					
0 0 0 0 0 0 0 80 80 80 00 80 80 00 0 0 0 0 0 0 0 0 80 8	3 243	0	0	0.0	\$0	\$0	\$0.00	9					
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 244	0	0	0.0	\$	\$0	\$0.00	\$					
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0	0	0.0	\$	\$0	\$0.00	\$0					
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 247	0	0	0.0	\$	\$0	\$0.00	\$0					
0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0 \$0.00 0 0.0 \$0 \$0 \$0.00 0 0.0 \$0 \$0 \$0.00 0 0.0 \$0 \$0 \$0.00 0 0 0.0 \$0 \$0 \$0.00 0 0 0 0 0 \$0 \$0 \$0.00 0 0 0 0 0 \$0 \$0 \$0.00 0 0 0 0 0 \$0 \$0 \$0.00 0 0 0 0 0 \$0 \$0 \$0.00 0 0 0 0 0 \$0 \$0 \$0.00 0 0 0 0 0 \$0 \$0 \$0.00 0 0 0 0 0 0 \$0 \$0 \$0.00 0 0 0 0 0 0 0 \$0 \$0.00 0 0 0 0 0 0 0 \$0 \$0.00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	252 د	0	0	0.0	\$0	\$0	\$0.00	\$					
0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0 0 \$0 \$0.00 \$0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 \$0 \$0.00 \$0	، 256	0	0	0.0	\$	\$0	\$0.00	\$0					
0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 \$0 \$0.00 \$0	، 259		0	0.0	\$0	\$0	\$0.00	\$0					
0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0 0 \$0 \$0 0 0 0 0 0 \$0 \$0 0 0 0 0 \$0 \$0 1 0 0 0 0 \$0 \$0 1 0 0 0 0 \$0	\$ 283	0	0	0.0	\$	\$0	\$0.00	\$0					
0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0 \$0 \$0.00 \$0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 \$0 \$0.00 \$0	3 286	0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0 \$0 \$0.00 \$0 0 0 0 0 \$0 \$0.00 \$0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 \$0		0	0	0.0	\$0	\$0	\$0.00	0\$					
0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0 0 \$0 \$0.00 \$0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 \$0 \$0.00 \$0	\$ 288	0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0 0 \$0 \$0 \$0.00 \$0 0 0 0 0 \$0 \$0.00 \$0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 \$0		0	0	0.0	⇔	\$	\$0.00	\$0					
0 0 0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0.0 \$0		0	0	0.0	\$0	\$0	\$0.00	\$					
0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00	295	0	0	0.0	\$	\$0	\$0.00	\$					
1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00	301	0	0	0.0	\$	\$0	\$0.00	\$0					
0 0 0 00 \$0 \$0.00	2 642	0	0	0.0	\$0	\$0	\$0.00	\$0					
	\$ 2201	0	0	0.0	\$0	\$0		\$0					
51 7,200 4 455 4219 413,243 45,029 45,607	TOTALS	31	7,286	4	\$543	\$380	\$219	\$13,243	\$5.029	\$5.607	\$465	\$5.142	-

ECO D-4E REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1250 W to 2 x F32/T8

0	C. 1 Off Old Contract	Coningo										
<u>8</u>	E. I-230W	SOW Savings Energy Savings				O.8.M	LCC Savings	LCC Savings Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs kV	KWH/Yr KW D	kW Demand	Use \$/Yr	Demand \$/Yr	\$∕⊀	₩	₩	⇔	€9	49	
T 6	0	0	0.0	\$	0\$	\$0.00	0\$					
P 41A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 41B	0	0	0.0	\$	\$	\$0.00	\$					
P 42A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 42B	0	0	0.0	\$	\$	\$0.00	\$0					
P 43A	0	0	0.0	\$	\$0	\$0.00	\$0					
P 43B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 44A	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 44B	0	0	0.0	0\$	\$	\$0.00	\$0					
P 45A	0	0	0.0	₽	\$0	\$0.00	\$0					
P 45B	0	0	0.0	\$	\$0	\$0.00	\$0					
P 46	0	0	0.0	\$	\$	\$0.00	\$0					
P 47	0	0	0.0	\$0	\$	\$0.00	\$0					
P 51A	0	0	0.0	\$	\$	\$0.00	\$ 0				4 .	
P 51B	0	0	0.0	\$	\$0	\$0.00	\$0					
P 52A	0	0	0.0	0\$	0 \$	\$0.00	\$0					
P 52B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 53	0	0	0.0	\$	\$0	\$0.00	\$0					
P 54	0	0	0.0	\$0	\$ 0	\$0.00	\$0					
P 55	0	0	0.0	\$0	\$	\$0.00	\$0					E
P 56	0	0	0.0	\$0	0\$	\$0.00	\$0					ď
P 57	0	0	0.0	\$0	\$0	\$0.00	\$0					2
P 58	0	0	0.0	\$0	\$0	\$0.00	\$0					1
P 59	0	0	0.0	\$0	\$0	\$0.00	\$0) 4
P 60	0	0	0.0	\$0	\$0	\$0.00	\$					4
S 79	0	0	0.0	\$0	\$0	\$0.00	\$0					4,
P 80	0	0	0.0	Ş	\$0	\$0.00	\$0					5 /
	0	0	0.0	₩	\$0	\$0.00	\$0					+{
P 101	0	0	0.0	\$	\$0	\$0.00	\$0					E
P 116	0	0	0.0	\$	0\$	\$0.00	\$0					T
T 120	0	0	0.0	\$	\$0	\$0.00	\$0					
T 121	0	0	0.0	\$0	\$0	\$0.00	\$0					20
T 124	0	0	0.0	\$0	\$0	\$0.00	\$0					• •
T 127	0	0	0.0	\$0	\$0	\$0.00	\$0) F
P 128	0	0	0.0	\$	\$0	\$0.00	\$0					
T 131	0	0	0.0	\$	\$ 0	\$0.00	\$0					3 5
S 144	0	0	0.0	\$0	\$0	\$0.00	\$0					

ECO D-4E REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1250 W to 2 x F32/T8

No. Freety Switches Freety Switches Freety Switches Freety Switches Freety Switches Freety Switches Freety Switches Freety Switches Freety Switches Freety Switches Freety Fwitches Freety Switches Freety Fwitches Free	Fac	E: 1-2	E: 1-250W Savings	Si								
Fitts William Mid-Jiff William Mid-Jiff William Mid-Jiff Sign of Si	o N		Energy Sav	ings			08M	LCC Savings Construction	Total Cost	Rebate	Investment	ď
156		Fxtrs	kWH/Yr	kW Demand	Use \$/Yr	Demand \$/Yr	\$/Yr	. θ	•	4	6	5
156		0	0	0.0	\$0	0\$	\$0.00	\$0				
156	T 149	0	0	0.0	\$0	\$0	\$0.00	\$0				
158	T 156	0	0	0.0	\$	0\$	\$0.00	\$0				
161 0	T 158	0	0	0.0	\$0	\$0	\$0.00	0\$				
162 0 0 0 50 50 50 50 50	T 161	0	0	0.0	\$	\$0	\$0.00	\$0				
163	T 162	0	0	0.0	\$	0\$	\$0.00	0\$				
164	T 183	0	0	0.0	\$0	\$0	\$0.00	\$0				
165	T 164	0	0	0.0	\$0	\$0	\$0.00	\$0				
166	T 165	0	0	0.0	\$	\$0	\$0.00	0\$				
167 0 50 \$0<	T 166	0	0	0.0	Q	\$0	\$0.00	\$0				
168 0 0.0 \$0		0	0	0.0	\$	\$0	\$0.00	\$0				
172 0 0 60 \$0 </td <td></td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$0</td> <td>\$0</td> <td>\$0.00</td> <td>04</td> <td></td> <td></td> <td></td> <td></td>		0	0	0.0	\$0	\$0	\$0.00	04				
177 0 0 0.0 \$0<	T 172	0	0	0.0	\$0	0\$	\$0.00	0\$				
178 0 0.0 \$0		0	0	0.0	\$	\$0	\$0.00	0\$				
186 0 0 0.0 \$0 \$0.00 \$0.		0	0	0.0	\$0	\$0	\$0.00	0\$				
186 0 0 0.0 \$0 \$0.00 190 0 0.0 \$0 \$0.00 191 0 0 0.0 \$0 \$0.00 191 0 0 0.0 \$0 \$0 \$0.00 191 0 0 0.0 \$0 \$0 \$0.00 192 0 0 0.0 \$0 \$0 \$0.00 192 0 0 0.0 \$0 \$0 \$0.00 192 0 0 0.0 \$0 \$0 \$0.00 192 0 0 0.0 \$0 \$0 \$0.00 192 0 0 0 0.0 \$0 \$0 \$0.00 192 0 0 0 0 0 0 \$0 \$0 \$0.00 193 0 0 0 0 0 0 \$0 \$0 \$0.00 193 0 0 0 0 0 0 \$0 \$0 \$0.00 194 0 0 0 0 0 0 \$0 \$0 \$0.00 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 195 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0	0	0.0	\$0	\$0	\$0.00	\$0				
190 0 0 0.0 \$0 \$0.00 197 0 0 0.0 \$0 \$0 \$0.00 198 0 0 0 0.0 \$0 \$0 \$0.00 205 0 0 0 0.0 \$0 \$0 \$0.00 206 0 0 0 0.0 \$0 \$0 \$0.00 207 0 0 0 0.0 \$0 \$0 \$0.00 208 0 0 0 0.0 \$0 \$0 \$0.00 208 0 0 0 0.0 \$0 \$0 \$0.00 212 0 0 0.0 \$0 \$0 \$0 \$0.00 213 0 0 0 0.0 \$0 \$0 \$0 \$0.00 229 0 0 0 0.0 \$0 \$0 \$0 \$0.00 229 0 0 0 0 0.0 \$0 \$0 \$0 \$0.00 229 0 0 0 0 0 0 \$0 \$0 \$0 \$0.00 229 0 0 0 0 0 0 \$0 \$0 \$0 \$0.00 229 0 0 0 0 0 0 \$0 \$0 \$0 \$0.00 230 0 0 0 0 0 \$0 \$0 \$0 \$0.00 230 0 0 0 0 0 \$0 \$0 \$0 \$0.00 230 0 0 0 0 0 \$0 \$0 \$0 \$0.00 2335 0 0 0 0 0 0 \$0 \$0 \$0 \$0.00 2335 0 0 0 0 0 0 \$0 \$0 \$0.00 2335 0 0 0 0 0 0 \$0 \$0 \$0.00 2335 0 0 0 0 0 0 \$0 \$0 \$0.00 2335 0 0 0 0 0 0 0 \$0 \$0 \$0.00 2335 0 0 0 0 0 0 0 \$0 \$0 \$0.00 2335 0 0 0 0 0 0 0 0 \$0 \$0 \$0.00 2335 0 0 0 0 0 0 0 0 \$0 \$0 \$0.00 2335 0 0 0 0 0 0 0 0 \$0 \$0 \$0.00 2335 0 0 0 0 0 0 0 0 \$0 \$0 \$0.00 2335 0 0 0 0 0 0 0 0 0 \$0 \$0 \$0.00 2335 0 0 0 0 0 0 0 0 0 0 \$0 \$0 \$0.00 2335 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	S 186	0	0	0.0	S S	\$0	\$0.00	0\$				
197 0 0.0 \$0	190		0	0.0	\$	\$	\$0.00	0\$				
198 0 0.0 \$0	S 197	0	0	0.0	\$0	0\$	\$0.00	0 \$				
205 0 0.0 \$0	S 198	0	0	0.0	\$	\$0	\$0.00	- (s				
205A 0 0.0 \$	P 205	0	0	0.0	\$	\$	\$0.00	0\$				
206 0 0.0 \$0	P 205A	0	0	0.0	\$0	\$	\$0.00	0\$				
207 0 0.0 \$0	P 206	0	0	0.0	\$	\$0	\$0.00	0\$				
207A 0 0.0 \$	P 207	0	0	0.0	\$	\$0	\$0.00	O\$				
208 0 0.0 \$0	P 207A	0	0	0.0	\$0	0\$	\$0.00	0\$				
208A 0 0.0 \$	P 208	0	0	0.0	\$	\$	\$0.00	0\$				
209 0 0.0 \$0	P 208A	0	0	0.0	₩	\$0	\$0.00	0\$				
210 0 0.0 \$0 \$0 211 0 0.0 \$0 \$0 \$0 212 0 0 0.0 \$0 \$0 \$0 219 0 0 0 \$0 \$0 \$0 229 0 0 0 \$0 \$0 \$0 229A 0 0 0 \$0 \$0 \$0 230 0 0 0 \$0 \$0 \$0 230A 0 0 0 \$0 \$0 \$0 235 0 0 0 \$0 \$0 \$0	P 209	0	0	0.0	\$	\$	\$0.00	0\$				
211 0 0.0 \$0 \$0 212 0 0.0 \$0 \$0 219 0 0.0 \$0 \$0 229 0 0.0 \$0 \$0 229A 0 0.0 \$0 \$0 230 0 0.0 \$0 \$0 230A 0 0.0 \$0 \$0 235 0 0.0 \$0 \$0 235 0 0.0 \$0 \$0	P 210	0	0	0.0	\$	\$0	\$0.00	0\$				
212 0 0.0 \$0 \$0 \$0 219 0 0.0 \$0 \$0 \$0 229 0 0 0.0 \$0 \$0 229A 0 0 0 \$0 \$0 230 0 0 0 \$0 \$0 230A 0 0 0 \$0 \$0 235 0 0 0 \$0 \$0		0	0	0.0	\$	\$0	\$0.00	O S				
219 0 0.0 \$0 \$0 \$0 229 0 0.0 \$0 \$0 \$0 229A 0 0.0 \$0 \$0 \$0 230 0 0 0 \$0 \$0 \$0 230A 0 0 0 \$0 \$0 \$0 235 0 0 0 \$0 \$0 \$0		0	0	0.0	\$	\$	\$0.00	O\$				
229 0 0.0 \$0 \$0 229A 0 0.0 \$0 \$0 230 0 0.0 \$0 \$0 230A 0 0.0 \$0 \$0 235 0 0 0.0 \$0 \$0		0	0	0.0	\$	0\$	\$0.00	O.				
229A 0 0.0 \$0 \$0 230 0 0.0 \$0 \$0 \$0 230A 0 0 0.0 \$0 \$0 235 0 0 0 \$0 \$0	P 229	0	0	0.0	₽	\$0	\$0.00	0\$				
230 0 0.0 \$0 \$0 230A 0 0.0 \$0 \$0 235 0 0 0.0 \$0 \$0		0	0	0.0	\$	\$0	\$0.00	0\$				- •
230A 0 0 0.0 \$0 \$0 \$0.00 235 0 0 0.0 \$0 \$0.00	P 230	0	0	0.0	\$	\$0	\$0.00	0\$				
235 0 0 0.0 \$0 \$0,00	P 230A	0	0	0.0	₩	\$	\$0.00	\$0				
		0	0	0.0	\$	0\$	\$0.00	O.				•

ECO D-4E REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1250 W to 2 x F32/T8

FXXTS KWH/MT KW Demmand Les \$/MT Demmand \$f/MT KW Demmand \$f/MT KW Demmand \$f/MT KW Demmand \$f/MT KW Demmand \$f/MT \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$	2 4 4	i 7	E. 1-250W Savings	5 P						() () () () () ()	4	4	
0 0 0 0 0 0 80 80 80 80 80 80 80 80 80 8	o Z	Fxtrs		vings kW Demand	Use \$/Yr	Demand \$/YI		LCC Savings	Construction \$	lotal Cost	Hebate	Investment \$	
0 0 0.0 \$0 \$0.00 \$	\$ 236	0	0	0.0	\$0	\$0	\$0.00	\$0					1
0 0 0.0 \$0 </td <td>S 237</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$0</td> <td>\$0</td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>	S 237	0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0.0 \$0 \$0.00 \$0 \$0.00 \$0 <		0	0	0.0	9	0\$	\$0.00	\$0					
0 0 50 \$0 <td>P 240</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$0</td> <td>0\$</td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>	P 240	0	0	0.0	\$0	0\$	\$0.00	\$0					
0 0 0 0 \$0	S 241	0	0	0.0	\$0	\$	\$0.00	\$0					
0 0 0 0 0 0 \$0 \$0 \$0 0 \$0 0 0 0 0 0 \$0 \$0 \$0 \$0 0 0 0 0	S 243	0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0 0 0 0 0 80 80 80 80 80 80 80 80 80 8	S 244	0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0 \$0 <td>S 246</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$0</td> <td>\$0</td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>	S 246	0	0	0.0	\$0	\$ 0	\$0.00	\$0					
9 3,538 1.7 \$264 \$185 \$93.72 \$6,289 \$1,755 \$1,957 \$225 1 393 0.2 \$29 \$21 \$104.14 \$699 \$195 \$217 \$25 10 3,831 1.9 \$293 \$206 \$104.14 \$698 \$1,950 \$21,74 \$250 0 0 0.0 \$0	S 247	0	0	0.0	\$0	\$0	\$0.00	\$0					
1 393 0.2 \$29 \$21 \$10.41 \$699 \$195 \$217 \$25 10 3,931 1.9 \$293 \$205 \$104.14 \$6,988 \$1,950 \$2174 \$250 0 0 0.0 \$0 <td>P 252</td> <td>6</td> <td>3,538</td> <td>1.7</td> <td>\$264</td> <td></td> <td></td> <td>\$6,289</td> <td>\$1,755</td> <td>\$1,957</td> <td>\$225</td> <td>\$1,732</td> <td></td>	P 252	6	3,538	1.7	\$264			\$6,289	\$1,755	\$1,957	\$225	\$1,732	
10 3,831 1.9 \$293 \$205 \$104.14 \$6,988 \$1,950 \$2,174 \$250 0 0 0 0 0 \$0	P 256	-	393	0.2	\$29		\$10.41	669\$	\$195	\$217	\$25	\$192	۔ ــ
0 0.0 \$0 \$0.00 <td>P 259</td> <td>9</td> <td>3,931</td> <td>1.9</td> <td>\$293</td> <td></td> <td>\$104.14</td> <td>\$6,988</td> <td>\$1,950</td> <td>\$2,174</td> <td>\$250</td> <td>\$1,924</td> <td></td>	P 259	9	3,931	1.9	\$293		\$104.14	\$6,988	\$1,950	\$2,174	\$250	\$1,924	
0 0.0 \$0 \$0.00 <td>S 283</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$</td> <td></td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>	S 283	0	0	0.0	\$		\$0.00	\$0					
0 0 0 50 \$0 <td>S 286</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$0</td> <td></td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>	S 286	0	0	0.0	\$0		\$0.00	\$0					
0 0.0 \$0 \$0.00 \$0		0	0	0.0	₩		\$0.00	\$0					
0 0 0 \$0 \$0 \$0 \$0 0 0 0 0 \$0	S 288	0	0	0.0	\$		\$0.00	\$0					
0 0 0.0 \$0 \$0 \$0 \$0 0 0 0.0 \$0 \$0.00 \$0 \$0 0 0 0.0 \$0 \$0 \$0 \$0 1 0 0.0 \$0 \$0 \$0 \$0 LS 20 7,862 4 \$586 \$411 \$208 \$13.976 \$3.900 \$4.348 \$500	S 290	0	0	0.0	\$0		\$0.00	\$					
0 0 0 \$0 <td>291</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$</td> <td></td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>	291	0	0	0.0	\$		\$0.00	\$0					
0 0 0 \$0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0 \$0 \$0.00 \$0 LS 20 7,862 4 \$586 \$411 \$208 \$13.976 \$3.900 \$4.348 \$500	P 295	0	0	0.0	\$		\$0.00	\$					
1 0 0 0.0 \$0 \$0.00 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 LS 20 7,862 4 \$586 \$411 \$208 \$13.976 \$3.900 \$4.348 \$500	P 301	0	0	0.0	\$0		\$0.00	\$0					
0 0 0 \$0 \$0.00 \$0 20 7,862 4 \$586 \$411 \$208 \$13.976 \$3.900 \$4.348 \$500	P 642	0	0	0.0	\$0		\$0.00	\$0					
20 7,862 4 \$586 \$411 \$208 \$13.976 \$3.900 \$4.348 \$500	S 2201	0	0	0.0	\$			\$0					
	TOTALS	50	7,862	4	\$586	\$411	\$208	\$13,976	006'£\$	\$4,348	\$500	\$3,848	۔ ا

ECO D-4F REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: I 300 W to 2 x F32/T8

Fac	F: 1-30	F: 1-300W Savings										
Š.		Energy Savings	Ø			O&M L	CC Savings	LCC Savings Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs	kWH/Yr kW Demand	/ Demand	Use \$/Yr Do	Demand \$/Yr	\$/Yr	⇔	₩	€9	₩	₩	
1 e	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 41A	0	0	0.0	\$0	\$0	\$0.00	\$					
P 41B	0	0	0.0	\$0	\$0	\$0.00	Ş					
P 42A	0	0	0.0	0\$	\$0	\$0.00	%					
P 42B	0	0	0.0	\$0	\$0	\$0.00	\$0					
P 43A	0	0	0.0	\$0	\$0	\$0.00	\$0					•
P 43B	0	0	0.0	\$0	\$0	\$0.00	0\$					
P 44A	0	0	0.0	\$0	\$0	\$0.00	\$					
P 44B	0	0	0.0	0 \$	\$0	\$0.00	\$0					
P 45A	0	0	0.0	\$0	\$0	\$0.00	0 \$					
P 45B	0	0	0.0	0\$	0\$	\$0.00	\$					
P 46	0	0	0.0	0 \$	0\$	\$0.00	\$0					
P 47	0	0	0.0	\$	0	\$0.00	\$0					
	0	0	0.0	\$ 0	\$	\$0.00	\$0					
P 51B	0	0	0.0	\$ 0	0\$	\$0.00	\$					
	0	0	0.0	\$0	0\$	\$0.00	\$0					
	0	0	0.0	9	0\$	\$0.00	\$					
P 53	0	0	0.0	\$0	\$	\$0.00	≎					
	0	0	0.0	\$0	\$	\$0.00	\$0					
	0	0	0.0	0\$	0 \$	\$0.00	Ş					
	0	0	0.0	\$0	\$	\$0.00	\$					E
	0	0	0.0	\$0	\$	\$0.00	\$					C
	0	0	0.0	\$0	\$	\$0.00	\$0					<u>I</u> C
P 59	0	0	0.0	\$0	\$0	\$0.00	Ş					,
	0	0	0.0	0\$	\$0	\$0.00	0\$					D
S 79	0	0	0.0	\$0	\$0	\$0.00	9					4
	0	0	0.0	0	\$0	\$0.00	Ş					L
	8	783	4 .	\$28	\$519	\$23.83	\$7,021	\$3,900	\$4,348	\$200	\$3,848	1.82
P 101	0	0	0.0	0	Q	\$0.00	Çş					H
P 116	0	0	0.0	\$0	\$0	\$0.00	\$0					E£
T 120	ო	3,341	0.7	\$249	\$78	\$101.66	\$4,955	\$585	\$652	\$75	\$577	8.58
T 121	0	0	0.0	\$0	\$	\$0.00	\$					2
T 124	0	0	0.0	0\$	\$0	\$0.00	0					.3
	0	0	0.0	Q	0\$	\$0.00	\$0					0
P 128	0	0	0.0	\$0	\$0	\$0.00	\$					F
	0	0	0.0	\$0	\$0	\$0.00	\$0					3
S 144	0	0	0.0	0	\$0	\$0.00	Ç,					3 5
												•

Fac	F: 1-3	F: I-300W Savings									
Š		Energy Savings	•			O&M	LCC Savings Construction	Total Cost	Rebate	Investment	SIR
	Fxtrs	kWH/Yr kW	kW Demand	Use \$/Yr	Demand \$/Yr	\$/Yr		 €9	₩	49	
S 146	0	0	0.0	\$0	0\$	\$0.00	0\$				
T 149	0	0	0.0	\$	\$0	\$0.00	0\$				
T 156	0	0	0.0	\$0	0	\$0.00	\$0				
T 158	0	0	0.0	0 \$	\$0	\$0.00	\$0				
T 161	0	0	0.0	\$	0\$	\$0.00	0\$				
T 162	0	0	0.0	Q \$	\$0	\$0.00	\$0				
T 163	0	0	0.0	\$0	\$	\$0.00	0\$				
1 164	0	0	0.0	0\$	\$0	\$0.00	\$0				
T 165	0	0	0.0	\$0	\$	\$0.00	\$0				
T 166	0	0	0.0	\$0	0\$	\$0.00	\$0				
T 167	0	0	0.0	\$	\$	\$0.00	\$0				
S 168	0	0	0.0	\$	\$	\$0.00	\$0				
T 172	0	0	0.0	\$0	0	\$0.00	\$0				
P 177	0	0	0.0	\$0	0\$	\$0.00	\$0				
	0	0	0.0	\$0	\$	\$0.00	\$0				•
S 182	0	0	0.0	\$0	\$0	\$0.00	\$0				
S 186	0	0	0.0	\$0	\$	\$0.00	\$0				
P 190	0	0	0.0	\$0	\$0	\$0.00	\$0				
S 197	0	0	0.0	\$0	\$0	\$0.00	\$0				
S 198	0	0	0.0	\$0	\$0	\$0.00	\$0				
P 205	0	0	0.0	\$0	\$	\$0.00	\$0				
P 205A	0	0	0.0	\$0	\$	\$0.00	\$0				
P 206	0	0	0.0	\$0	\$	\$0.00	\$0				E
P 207	0	0	0.0	\$0	\$0	\$0.00	\$0				<u>ر</u>
P 207A	0	0	0.0	\$0	\$	\$0.00	\$0				0
P 208	0	0	0.0	Q	\$	\$0.00	\$0				1
P 208A	0	0	0.0	Q	\$	\$0.00	\$0				D 4
P 209	0	0	0.0	Ç¢	\$0	\$0.00	\$0				4
P 210	0	0	0.0	\$	\$0	\$0.00	\$0				5
P 211	0	0	0.0	\$	\$	\$0.00	\$0				H
P 212	0	0	0.0	\$ 0	\$0	\$0.00	\$0				ΕÆ
P 219	0	0	0.0	Q	\$	\$0.00	\$0				ग
P 229	0	0	0.0	\$	\$	\$0.00	\$0				. 2
P 229A	0	0	0.0	₩	\$0	\$0.00	\$0				24
P 230	0	0	0.0	\$ 0	\$0	\$0.00	\$0				} <
	0	0	0.0	\$	0\$	\$0.00	\$0) (
S 235	0	0	0.0	\$0	\$0	\$0.00	\$0				=

ECO D-4F REPLACE INCANDESCENT LIGHTING WITH FLUORESCENT: 1300 W to 2 x F32/T8

No. Energy Salvings O&M. LCC Salvings Construction Total Cost Rebate Replacement (New Demand Lass NYT. Demand S/YT. S/Y	Fac	표 :	F: 1-300W Savings	<u>s</u>									
Extis KWHMMY KWD Demand SN \$N	ė Ž			ings			O&M	LCC Savings Constru	ction	Total Cost	Rebate	Investment	SIR
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		Fxtrs	kWH/Yr		Use \$/Yr	Demand \$/Yr	\$∕⊀	₩	€9	₩	49	49	
0 0 0 0 0 0 0 0 80 80 80 0 80 80 80 80 8		0	0	0.0	\$0	\$0	\$0.00	0\$					
0 0 0 0 0.0 \$0 \$0.0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0		0	0	0.0	\$0	\$	\$0.00	\$0					
0 0 0.0 \$0 \$0.00	\$ 238	0	0	0.0	\$0	\$0	\$0.00	0\$					
0 0 60 \$0.00		0	0	0.0	\$0	\$	\$0.00	0\$					
0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 \$0 0 0 0.0 \$0 \$0 \$0 \$0 \$0 0 0 0 0 0 \$0 \$0 \$0 \$0 0 0 0 0 \$0 <td< td=""><td></td><td>0</td><td>0</td><td>0.0</td><td>\$0</td><td>\$</td><td>\$0.00</td><td>\$0</td><td></td><td></td><td></td><td></td><td></td></td<>		0	0	0.0	\$ 0	\$	\$0.00	\$0					
0 0 0 0 0 0 0 80 80 80 0 80 80 80 80 80		0	0	0.0	\$0	\$	\$0.00	0\$					
0 0 0 0 0.0 \$0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0 \$0.00 \$0 0 0 0 0 0.0 \$0 \$0 \$0.00 \$0 0 0 0 0 0 0 \$0 \$0 \$0 0 0 0 0 0 \$0 \$0 \$0 0 0 0 0		0	0	0.0	\$0	\$	\$0.00	0\$					
0 0 0 0.0 \$0 \$0.0 \$0.0 \$0 0 0.0 \$0 \$0.0 \$0.		0	0	0.0	\$0	\$	\$0.00	0\$					
0 0 0.0 \$0 \$0.0 \$0 \$0.0 \$0	S 247	0	0	0.0	\$0	\$0	\$0.00	0\$					
0 0 0.0 \$0.00 <td>P 252</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$0</td> <td>\$</td> <td>\$0.00</td> <td>0\$</td> <td></td> <td></td> <td></td> <td></td> <td></td>	P 252	0	0	0.0	\$0	\$	\$0.00	0\$					
0 0 0 \$0 <td>P 256</td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$0</td> <td>\$</td> <td>\$0.00</td> <td>0\$</td> <td></td> <td></td> <td></td> <td></td> <td></td>	P 256	0	0	0.0	\$0	\$	\$0.00	0\$					
0 0 0.0 \$0 \$0.00 \$	P 259	0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0 0.0 \$0 \$0.00 \$	S 283	0	0	0.0	\$	\$0	\$0.00	\$0					
0 0.0 \$0 \$0.0 \$0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0 \$0 1 0 0 0.0 \$0 \$0 \$0 23 4,124 5 \$307 \$597 \$125 \$11,976 \$4,485 \$5,000	S 286	0	0	0.0	\$0	\$0	\$0.00	\$0				er-	
0 0.0 \$0 \$0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 \$0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 \$0 \$0.00 \$0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0	0	0.0	\$0	\$	\$0.00	0\$					
0 0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0		0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0 0.0 \$0 </td <td></td> <td>0</td> <td>0</td> <td>0.0</td> <td>\$0</td> <td>\$0</td> <td>\$0.00</td> <td>\$0</td> <td></td> <td></td> <td></td> <td></td> <td></td>		0	0	0.0	\$0	\$0	\$0.00	\$0					
0 0 0.0 \$0 \$0.00 \$0 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0		•	0	0.0	\$	\$0	\$0.00	\$0					
0 0 0 0.0 \$0 \$0.00 \$0 0 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 1.5 23 4,124 5 \$307 \$597 \$125 \$11,976 \$4,485 \$5,000	P 295	0	0	0.0	\$0	\$0	\$0.00	\$0					
1 0 0 0.0 \$0 \$0.00 \$0 1 0 0 0.0 \$0 \$0.00 \$0 -S 23 4,124 5 \$307 \$597 \$125 \$11,976 \$4,485 \$5,000		0	0	0.0	\$	\$0	\$0.00	\$0					
23 4,124 5 \$307 \$125 \$11,976 \$4,485 \$5,000	P 642	0	0	0.0	\$0	\$	\$0.00	\$0					
23 4,124 5 \$307 \$597 \$125 \$11,976 \$4,485 \$5,000	S 2201	0	0	0.0	\$0	\$0	\$0.00	\$					
	TOTALS	ឌ	4,124	5	\$307	\$597	\$125		\$4.485	\$5.000	\$575	\$4.425	2.71
		TOTA	I S ONLY FO	ON IN IN HO	S WITH SIR	S OVER 1.0			•		! !	<u>:</u>	i

Region No. 4

Fort Hunter Liggett, California

Location:

Sheet of 35

Project No. 16-403-10

•		ndescent to Fluoresco	ent			Fiscal Year FY96
Discrete Portion	on Name: A. I60V : March 1993	V to 13W/514	Economic Life:	15	YEARS	Preparer: KELLER & GANNON
1. Investment A. Construction B. SIOH C. Design Cost D. Total Cost E. Salvage Va F. Public Utilit	Costs on Costs	ate	\$21,175 \$1,165 \$1,270 \$23,610	- - -	\$0 (\$2,715)	 \$20,895
	rings (+)/Cost(-): R 85-3273-X Used	d for Discount Factor	S	_		
Energy Source	Cost \$/MTBU/(1)	Saving MBTU/YR(2)	Annual \$ Savings(3)		Discount Factor(4)	Discounted Savings(5)
A. Elec. B. Dist C. Propane D. Demand E. Other F. Total	\$21.84 \$4.98 \$7.87 \$108.60	77.2 0.0 0.0 7.8	\$1,686 \$0 \$0 kW \$845	-	11.70 13.78 14.16 11.70	\$19,729 \$0 \$0 \$9,889
	y Savings (+) or	Cost (-):	, ,			· ,
A. Annual Rec			\$894		11.12	\$9,945
B. Non Recur	ring Savings (+)	or Cost (-)				
ltem	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)		Doscounted Sav- ings(+)Cost(-)(4)	
a. b. c. d. Total			.· 	=	1000-27-4-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-	
C Total Non E	Energy Discounte	d Savings (3A2+3Bd	4)		\$9, 94 5	
5. Total Net D 6. Savings to	back 1G/(2F3+3. iscounted Saving Investment Ratio ternal Rate of Re	(SIR) 5/1G:	Life)):		6.1 \$39,564 1.89 8.52%	Years

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8.46%

		ndescent to Fluorescent	Region No. 4			Project No. Fiscal Year	16-403-10 FY96
	ion Name: B. I75\ e: March 1993	N to 16W//14	Economic Life:	15	YEARS	Preparer: K	ELLER & GANNO
E. Salvage V F. Public Utili	on Costs	ate	\$234 \$13 \$14 \$261	- - -	\$0 (\$30)	 \$231	
	vings (+)/Cost(-): IR 85-3273-X Use	d for Discount Factors		-			
Energy Source	Cost \$/MTBU/(1)	Saving MBTU/YR(2)	Annual \$ Savings(3)		Discount Factor(4)	Discounted Savings(5)	I
A. Elec. B. Dist C. Propane D. Demand E. Other	\$21.84 \$4.98 \$7.87 \$108.60	0.7 0.0 0.0 0.1 kW	\$16 \$0 \$0 \$11		11.70 13.78 14.16 11.70	\$181 \$0 \$0 \$127	
F. Total	Sovinno (1) or	Cost ():	\$26	-		\$308	 '1
A. Annual Re (1) Discount (2) Discounte	curring (+/-) Factor (Table A) d Savings/Cost (rring Savings (+)	3A x 3A1)	\$11	-	11.12	- \$125	
ltem	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)		Doscounted Savings(+)Cost(-)(4)		
a. b. c. d. Total				=		•	
C Total Non	Energy Discounte	ed Savings (3A2+3Bd4)			\$125		
5. Total Net [yback 1G/(2F3+3 Discounted Saving Investment Ratio)):		6.1 \$433 1.88	Years	

7. Adjusted Internal Rate of Return (AIRR):

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•		descent to Fluorescent	Region No. 4			Project No. 16-403-10 Fiscal Year FY96
	ion Name: C. I100\ e: March 1993	W to 18W//14	Economic Life:	15	YEARS	Preparer: KELLER & GANNON
1. Investment A. Constructi B. SIOH C. Design Co	on Costs		\$3,159 \$174 \$190 \$3,522	- - -		
	t (1A+1B+1C) alue of Existing Eq	uipment	ψ0,522		\$0	
	ity Company Reba stment (1D-1E-1F)	te			(\$405)	- \$3,117
G. Total inve	saneni (10-12-17)					40 ,117
	vings (+)/Cost(-): IR 85-3273-X Used	for Discount Factors		-		
Energy	Cost	Saving	Annual \$		Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
A. Elec. B. Dist C. Propane D. Demand	\$21.84 \$4.98 \$7.87 \$108.60	16.8 0.0 0.0 2.0 kV	\$367 \$0 \$0 \$220		11.70 13.78 14.16 11.70	\$4,292 \$0 \$0 \$2,573
E. Other F. Total			\$587	=		\$6,865
	y Savings (+) or C	Cost (-):		-		
A. Annual Re	curring (+/-)		\$221	_		
· ·	Factor (Table A)	A = 2A1\			11.12	- \$2,457
(2) Discounte	ed Savings/Cost (3	A X SAI)				Ψ2,407
B. Non Recu	rring Savings (+) o	or Cost (-)				
ltem	Savings(+) Cost(-)(1)	Year of Occur. (2)	Discount Factor(3)		Doscounted Sav- ings(+)Cost(-)(4)	
a.						
b. c.			<i>=</i>			•
d. Total				•		ı
C Total Non i	Energy Discounted	Savings (3A2+3Bd4)			\$2,457	
		+(3Bd1/Economic Life)):		3.9	Years
	Discounted Savings Investment Ratio (\$9,322 2.99	
_	nternal Rate of Ret	•			11.88%	

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29 35

	Fort Hunter Ligg LIGHTING - Incar ion Name: D. I150	descent to Fluorescen	Region No. 4 t			Project No. 16-403-10 Fiscal Year FY96	
	e: March 1993	W 10 20W/014	Economic Life:	15 YEARS	3	Preparer: KELLER & GANI	NON
1. Investmen			AF 000	_			
A. Constructi	on Costs		\$5,029	_			
B. SIOH			\$277				
C. Design Co			\$302	_			
	t (1A+1B+1C)		\$5,607		\$0		
_	alue of Existing Ed				\$465)	_	
	ity Company Reba				(403)	 \$5,142	
G. Total Inve	stment (1D-1E-1F)	1				φ3, 142	
2. Energy Sa	vings (+)/Cost(-):			_			
		for Discount Factors		-			
Energy	Cost	Saving	Annual \$	Discou	ınt	Discounted	
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Factor	(4)	Savings(5)	
A. Elec.	\$21.84	24.9	\$543	1	1.70	\$6,354	
B. Dist	\$4.98	0.0	\$0		3.78	\$0	
C. Propane	\$7.87	0.0	\$0		4.16	\$0	
D. Demand	\$108.60		w \$380		1.70	\$4,451	
E. Other	Ψ100.00				·	· · · ·	
F. Total			\$924			\$10,805	
3. Non Energ	gy Savings (+) or	Cost (-):		_			
A Annual Re	curring (+/-)		\$219				
	Factor (Table A)			_ 1	1.12		
` '	ed Savings/Cost (3	3A x 3A1)				\$2,438	
B. Non Recu	rring Savings (+)	or Cost (-)					
ltem	Savings(+)	Year of	Discount	Dosco	unted Sav-		
Nom:	Cost(-)(1)	Occur. (2)	Factor(3)	ings(+)Cost(-)(4)		
a.							
b.							
C.							
d. Total							
C Total Non	Energy Discounte	d Savings (3A2+3Bd4))	\$2	2,438		
4. Simple Pa	yback 1G/(2F3+3	A+(3Bd1/Economic Li	fe)):		4.5	Years	
•	Discounted Saving		•		\$13,243		
	Investment Ratio				2.58		
	nternal Rate of Re				10.77%		

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GANNON

Location:	Fort Hunter Ligg	gett, California	Region No. 4			Project No. 16-403-
•		ndescent to Fluorescent				Fiscal Year FY96
Discrete Port	ion Name: E. I250	W to 2-F32/T8				
Analysis Date	e: March 1993		Economic Life:	15	YEARS	Preparer: KELLER &
1. Investmen	t Costs					
A. Constructi	on Costs		\$3,900			
B. SIOH			\$214	_		
C. Design Co	ost		\$234	_		
	t (1A+1B+1C)		\$4,348		4.5	
_	alue of Existing Ed				\$0	_
	ity Company Reba				(\$500)	
G. Total Inve	stment (1D-1E-1F)					\$3,848
2. Energy Sa	vings (+)/Cost(-):					
		d for Discount Factors		-		
Energy	Cost	Saving	Annuai \$		Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
A. Elec.	\$21.84	26.8	\$586		11.70	\$6,857
B. Dist	\$4.98	0.0	\$0 ***		13.78	\$0 - \$0
C. Propane	\$7.87		\$0 *		14.16	•
D. Demand	\$108.60	3.8 kV	/ \$411		11.70	\$4,803 -
E. Other			\$997	=		\$11,660
F. Total			\$ 99 7			\$11,000
3. Non Energ	gy Savings (+) or	Cost (-):	When the same	_		
A. Annuai Re	curring (+/-)		\$208			
(1) Discount	Factor (Table A)			_	11.12	_
(2) Discounte	ed Savings/Cost (3A x 3A1)				\$2,316
B. Non Recu	rring Savings (+)	or Cost (-)				
Item	Savings(+)	Year of	Discount		Doscounted Sav-	-
	Cost(-)(1)	Occur. (2)	Factor(3)		ings(+)Cost(-)(4)	1
a.						_
b.			- *			-
C.				22		:
d. Total						
C Total Non	Energy Discounte	d Savings (3A2+3Bd4)			\$2,316	
		A+(3Bd1/Economic Life)):		3.2	Years
	Discounted Saving				\$13,976	
_	Investment Ratio				3.63	
7 Adjusted I	nternal Rate of Re	turn (AIRR):			13 34%	

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11.14%

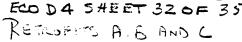
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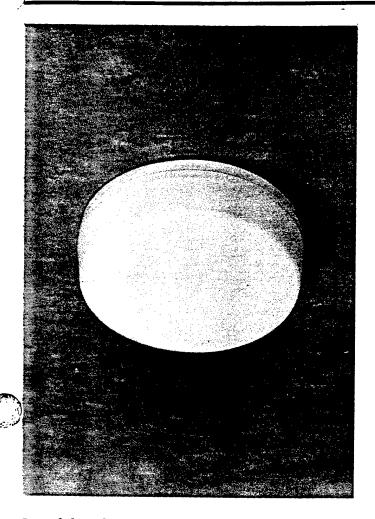
Location: Project Title:	Fort Hunter Ligg	gett, California ndescent to Fluorescent	Region No. 4			Project No. 16-403-10 Fiscal Year FY96
	ion Name: F. I300					
	e: March 1993		Economic Life:	15	YEARS	Preparer: KELLER & GANNO
1. Investmen	t Costs			_		
A. Constructi	on Costs		\$4,485	_		
B. SIOH			\$247			
C. Design Co			\$269	_		
	(1A+1B+1C)		\$5,000		40	
_	alue of Existing E				\$0	
	ity Company Reb				(\$575)	\$4.40E
G. Total Inve	stment (1D-1E-1F))				\$4,42 5
2. Energy Sa	vings (+)/Cost(-):		_	_		
		d for Discount Factors		_		
Energy	Cost	Saving	Annual \$		Discount	Discounted
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)		Factor(4)	Savings(5)
Cource	Ψ,23,(.,	,(()	
A. Elec.	\$21.84	14.1	\$307		11.70	\$3,596
B. Dist	\$4.98	0.0	\$0		13.78	\$0
C. Propane	\$7.87	0.0	\$ 0		14.16	\$0
D. Demand	\$108.60	5.5 kW	\$597		11.70	\$6, 9 85
E. Other				_		
F. Total			\$904			\$10,581
3. Non Energ	y Savings (+) or	Cost (-):		_		
A. Annual Re	curring (+/-)		\$125			
	Factor (Table A)			_	11.12	
	ed Savings/Cost (3A x 3A1)				\$1,395
B Non Becu	rring Savings (+)	or Cost (-)				
			Discount		Doscounted Sav-	
lte m	Savings(+)	Year of	Discount Factor(3)		ings(+)Cost(-)(4)	•
	Cost(-)(1)	Occur. (2)	Pactor(3)		111gs(+)Cost(-)(4)	
a.						
b.			~-			
C.				=		•
d. Total				_		
C Total Non	Energy Discounte	d Savings (3A2+3Bd4)			\$1,395	
4 Simple Par	vback 1G//2F3+3	A+(3Bd1/Economic Life))):		4.3	Years
	Discounted Saving		· · ·		\$11,976	
	Investment Ratio				2.71	

7. Adjusted Internal Rate of Return (AIRR):

Heavy Duty Unbreakable Vandal Resistant Lens

Energy Saving, Indoor or Outdoor Cut Lighting Cost Up to 80%





7, 9, 13 or 26 Watt Vandal Resistant Fluorescent Wall or Ceiling

As rugged as it is stylish, this vandal resistant wall or ceiling fixture is the ideal choice for doorway and corridor lighting where style and durability is required.

Housing: Spun steel, painted with electrostatically applied white polyester powder coating.

Diffuser: UV stabilized, injection molded white Acrylic DR.

Ballast: Preheat NPF, 118 volt, engineered specifically for the designated lamp, 7, 9, or 13 watt, 20, 22 watt circline.

Marking: U.L. listed and labeled, damp location standard, use indoor or outdoor.

Annual Energy Savings When Replacing Incandescent

Fluorescent	Equivalent	Dollar Savings per KWH						
Lamp	Incandescent	6¢	8¢	10¢				
7 watt 9 watt	40 watt 60 watt	16.29 25.75	21.72 39.94	27.16 49.92				
13 watt	75 watt	31.01	41.35	51.68				

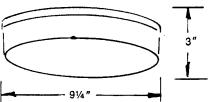
Note: Based on burning 24 hours per day. Equivalent incandescent wattages are approximates, and are based on replacing standard A-Line incande lamps. Wattage comparison may vary with application.

Footcandle Measurements

Based on single wall mounted fixture • 6' wide corridor 8' ceiling height • 6' mounting height • 80% ceiling reflectance 50% wall reflectance • 20% floor reflectance.

Catalog	Dista	nce fro	m fixtu	ire alo	ng the	wail			
number	0′	2′	4′	6′	8′	10′	12'	14'	16′

Specifications



Ordering Information/Operating Characteristics

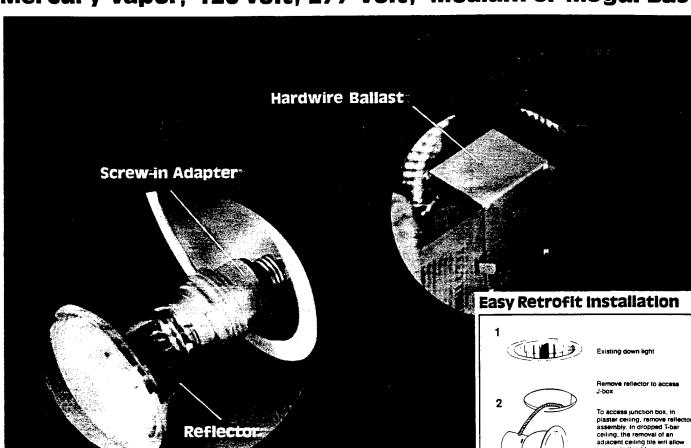
Catalog number	Lamp Type	Initial Lumens	Approximate Incandescent Equivalent	Lamp* Life hours	input Volts	Input Watts	Input Amps Starting	Input Amps Operating	Minimum starting Temp.
1401-7	PL-7	400	40	10,000	118	9	.240	.180	0°F
1401-9 1401-13 1401-2X13	PL-9 PL-13 PL-13	600 900 1800	60 75 100	10,000 10,000 10,000	118 118 18	11 15 30	.240 .350 .700	.180 .250 .500	25°F 32°F 32°F

Based on 3 hr burn-longer burning cycle will result in proportionally longer life.



The Ultimate Fluorescent Retrofit! From Janmar

Convert Virtually Any Recessed Fixture, Incandescent, Mercury Vapor, 120 Volt, 277 Volt, Medium or Mogul Base



Patent Pending

You Make The Choice!

At last you can select the length, the wattage and reflector to exactly fit your lighting requirements.

Convert those, energy robbing, Incandescent or Mercury Vapor recessed fixtures to energy efficient Flourescent, quickly and easily. No need to remove existing socket. Simply wire in ballast assembly to the top of junction box, and screw in adapter-reflector assembly.

Check These Options!

Bailast • 120 Volt, 277 Volt

High Power Factor

· Class P (Thermal Protection)

Lamps • 5, 7, 9 or 13 Watt Twin Tube

• 13 Watt Quad Double Twin Tube

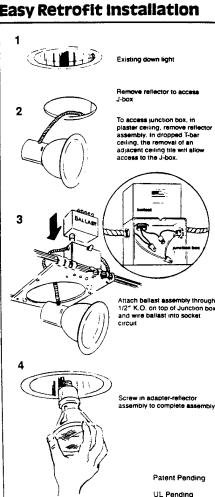
28 Watt Quad Double Twin Tube

Length • 3 Optional Adapter Lengths for

Various Depth Fixtures.

Base • Medium Edison Standard

Mogul Base Optional



アモオルカナラ

213 Series The Ultimate Fluorescent Retrofit!

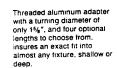


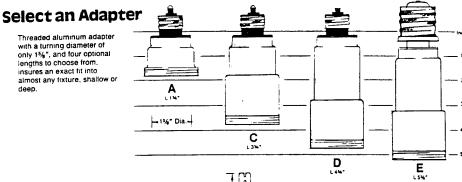
PL Lamp

Aluminized Glass Reflector

Aluminum Ballast

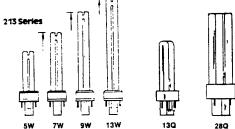
Housing Type 1





Select a Lamp

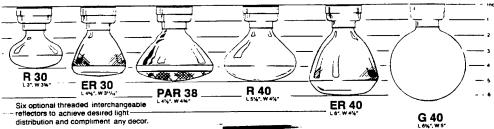
Nine optional lamp wattages insures desired level of illumination.



Mogul Base optional on all units, use order suffix MR. add %" to overall length.

Maximum



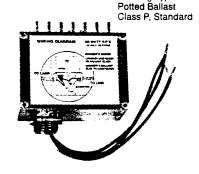




Reflector available on all 213 Series



Ordering Information / Operating Characteristics 213 Series



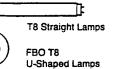
Options:

277 Volt (120 Volt Standard) HP High Power Factor

MB Mogul Base

REF Reflector Edison Socket Extender MBE Mogul Base Socket Extender

Model No. & Option Suffix	Flourescent Lamps Watts and Initial Lumens	Incandescent replacement	Optional reflectors		nal Scr lled Ler		ocket	Foot-Candle: at 8'
	Single Twin Lamps			Α	С	D	Ε	
213-5A-R30 213-5A-ER30 213-5A-R40 213-5A-PAR 38 213-5A-G40	5 Watt Twin Tube 250 Lumens :	25 to 40 Watts 200 to 350 Lumens	R 30 ER 30 R 40 PAR 38 G 40	4¾" 5¾" 6½" 6¼" 7¾"	5¾" 6¾" 7½" 7¼" 8¾"	6¾" 7¾" 8½" 8¼" 9¾"	74" 84" 9½" 9¼" 10¾"	2.3 2.3 3.9 4.3
213-7A-ER30 213-7A-R40 213-7A-PAR 38 213-7A-G40	7 Watt Twin Tube 400 Lumens	40 to 75 Watts 350 to 765 Lumens	ER 30 R 40 PAR 38 G 40	5¾" 6½" 6¼" 7¾"	6¾" 7½" 7¼" 8¾"	7¾" 8½" 8¼" 9¾"	8¾* 9½* 9¼* 10¾*	2.5 2.3 4.0 1.1
213-9A-ER40 213-9A-G40	9 Watt Twin Tube 600 Lumens	50 to 100 Watts 425 to 1200 Lumens	ER 40 G 40	7½" 7¾"	8½″ 8¾″	9½″ 9¾″	10½″ 10¾″	4.3 1.7
	10mm Quad Double	Twin Lamps		Α	С	D	Ε	
213-13Q-A-ER30 213-13Q-A-R40 213-13Q-A-PAR 38 213-13Q-A-G40	13 Watt Quad Double Twin Tube 900 Lumens	75 to 150 Watts 765 to 1740 Lumens	ER 30 R 40 PAR 38 G 40	5¾" 6½" 6¼" 7¾"	6¾" 7½" 7¼" 8¾"	7¾* 8½* 8¼* 9¾*	8¾" 9½" 9¼" 10¾"	3.3 6.9 7.2 1.6
	15mm Quad Double	Twin Lamps	,	Α	С	D	E	
213-28Q-A	28 Watt Quad Double Twin Tube 1600 Lumens	150 to 200 Watts 1740 to 2000 Lumens	R 60	9	10	11	12	12.4





		Ece	D4	SHEET	<u>35 0</u>	F35
Lamp Datas Min Circuit Start	n: ting: Catalog Numbers	_	Electrical Datas	Sound Dimensions	Wiring#	Shipping Datas
(Volts) Tem	np:: (All Class:P)†*		Line Input Current ANSI (Amps) (Watts)	3 (= 3 = == , ==	No: (Page:24)	Cital Cital Cita-
One Lamp High Bower F	Easter		•			

One L	amp—ŀ	ligh P	ower	Factor
-------	-------	--------	------	--------

(1) FBO16T8, (1) F17T8,	16 17	120	50	R-1P817-TP		.195	23	4 30 44			
(1) FO17T8	17	277	50	V-1P817-TP		.085	23	A	TZ. 20	10	38
(1) FBO24T8, (1) F25T8,	24 25	120	5 0	R-1P825-TP	2	.30	33	1			
(1) FO25T8	25	277	50	V-1P825-TP		.12	33	1 22	P21 20.	10	38
(1) FBO31T8, (1) F32T8,	31 32	120	50 50 50 50	R-1P32-TP REL-3P32-TP (Electronic) RIC-140-TP (Electronic IC) RIC-132-TP (Electronic IC)	1,2 50 2,5 5	.32 .34 .35 .27	37 37 40 31		20 93 2 20 20 20	10	37 26 15 15
(1) FO32T8	32	277	50 50 50 50	V-1P32-TP VEL-3P32-TP (Electronic) VIC-140-TP (Electronic IC) VIC-132-TP (Electronic IC)	1,2 50 5 5	.14 .15 .15	37 37 40 31		93 93 20 20	10	37 26 15 15
(1) F40T8,	40	120	50	R-1P840-TP	2	.44	50	AME	F2 # 1 34,202	10	38
(1) FO40T8	40	277	50	V-1P840-TP		.19	50	A	1976 B2 11 1 20 1	10	38

Two Lamps—High Power Factor

Two Lamps	—Hiç	gh Po	wer F	actor				/ RETRUST E AN	OF	
(2) FBO16T8, (2) F17T8,	16 17	120	50	R-2P817-TP		.39	45	AND CAUTE OF SELECT	10	38
(2) FO17T8	17	277	50	V-2P817-TP		.163	45	- 12 12 121 21 21 21 21 21 21 21 21 21 21		38
(2) FBO24T8, (2) F25T8.	24 25	120	50	R-2P825-TP	2	.55	65	- AN ENTRY #9215-		38
(2) FO25T8	25	277	50	V-2P825-TP		.24	65	1/AN 7/58-28 14 5 521	10	38
(2) FBO31T8, (2) F32T8.	31 32	120	50 50 50 50	R-2P32-TP REL-3P32-TP (Electronic) RIC-2S40-TP (Electronic IC) RIC-2S32-TP (Electronic IC)	1,2 2,40,50 2,5,49 5,49	.61 .57 .65	71 64 77 61	21E 31E 31E 31E	10	37 26 15 15
(2) FO32T8	32	277	50 50 50 50	V-2P32-TP VEL-3P32-TP (Electronic) VIC-2S40-TP (Electronic IC) VIC-2S32-TP (Electronic IC)	1,2 2,4 0,50 2,5,49 5,49	.26 .24 .27 .22	71 63 73 60	74 8 8 1 1	10	37 26 15
(2) F40T8,	40	120	50	R-2P840-TP	2	.77	92		10	38
(2) FO40T8	40	277	50	V-2P840-TP		.34	92	A40 725 - 21'9	10	38

Three Lamps—High Power Factor

(3) FBO16T8, (3) F17T8.	16 17	120	50	REL-3P32-TP (Electronic) REL-4P32-TP (Electronic)	50 50	.45 .46	51 53	A 93:-	40	26 25
(3) FO17T8	17	277	50	VEL-3P32-TP (Electronic) VEL-4P32-TP (Electronic)	50 50	.18 .20	46 51	A 93 - 97 - 97	10	26 25
(3) FBO24T8, (3) F25T8,	24 25	120	50	REL-3P32-TP (Electronic) RIC-3S32-TP (Electronic IC)	50 5	.61 .58	70 68			26 25
(3) FO25T8	25	277	50	VEL-3P32-TP (Electronic) VIC-3S32-TP (Electronic IC)	5 0 5	.25 .25	65 66		10	26 25
(3) FBO31T8, (3) F32T8,	31 32	120	50	REL-3P32-TP (Electronic) REL-4P32-TP (Electronic) RIC-3S32-TP (Electronic IC)	50 50 5	.77 .80 .82	89 93 95	A 2 97.4	10	26 25 25
(3) FO32T8	32	277	50	VEL-3P32-TP (Electronic) VEL-4P32-TP (Electronic) VIC-3S32-TP (Electronic IC)	50 50 5	.31 .34 .34	83 91 93	A F2 93 97 93	10	26 25 25
(3) F40T8, (3) FO40T8	40	120 277	50 50	REL-3P32-TP (Electronic) VEL-3P32-TP (Electronic)	40,50 40,50	.93 .38	108 100	A F2 93	10	25

Four Lamps—High Power Factor

(4) FBO16T8 (4) F17T8	16	120	50	REL-4P32-TP (Electronic)	50	.57	66	A: 54	€- T2	97	10	25
(4) FO17T8	17	277	50	VEL-4P32-TP (Electronic)	50	.23	61	Α -	2 - T-2	97	10	25
(4) FBO24T8 (4) F25T8	24 25	120	50	REL-4P32-TP (Electronic)	50	.77	89	Anny	1-2 ·	97	10	25
(4) FO25T8	25	277	50	VEL-4P32-TP (Electronic)	50	32	85	A ~	72°	97	10	25
(4) F32T8, (4) FO32T8,	32	120	50	REL-4P32-TP (Electronic)	50	.97	112	A-	17-2	97	10	25
(4) FBO31T8	32	277	50	VEL-4P32-TP (Electronic)	50	.41	110	A	T-2	. 97	10	25

NOTES: 1. CBM Approved. 2. CSA Approved. 5. Mark V Integrated Circuit electronic ballast. 40. Will also operate FO17. FO25 and FO40T8 rapid start lamps. 49. Remote Mounting—One or two lamp remote mounting. For single lamp remote mounting, only "red lead" lamp can be mounted remote from fixture. Maximum remote mounting. 20 ft. lead length. 50. Parallel Connect ballast. Will instant start rapid start lamps. rapid start lamps.

†Ordering Information: Units shown are furnished with Class P ADVAN-guard® Automatic Resetting Thermostat. Units packed in Individual Cartons—Add suffix—I.

Keller & Gannon

Engineers-Architects

COMPUTED BY RCL	- INSTALL ELECTRONIL	PROJECT 16-403-10
CHECKED BY	3 BALLAST & TE LAMPS	
REV19	Eco#D5	SHEET NOOF SHEETS
DESCRIPTION OF	ACTION	
THIS RETRO	FIT WOULD REPLACE EXISTING	FLANDIZESCENT BALLASTS
	ENGT SAVING CORE + COIL BALLAS	_
	BALLASTS AND F32/TE LAW	,
SAVINGS AND K	W DEMAND SAVINGS WILL RESU	ut.
SCREENING ANA	<u> </u>	
(1) 2-LAMP BA	LAST \$ T8 LAMP RETROFIT - 1	MHIT ANALYSIS
SAVINGS:	72W(EXIST) - 61 W (NEW) = 11	W × 2860 HRS = 31.5 KWH/
107 CALLAGE	= 31.5 KWH/10x \$0.07454/K	1000 W/hW /
LCC STIVING	and a contract of the contract	
	.011 hwx 108.60/	KM X (1:15 Nbm.
	740.75	
COSTS: N	INTERIAL - 132 × 1.08 = 34.56	
	ABOR - 31.60	1.30×1.01×1.10×1.11 =
Anada ay uu aana ahaa ahaa ahaa ahaa ahaa ahaa a	ital cost \$106	1.30 × 1.01 × 1.10 × 1.11\ -
1	P44E REBATE (*12)	
	al Investment \$ 94	
SIR = 3	to.75/194	
= 0	.43	
	LAST 4 T8 LAMP RETILORIT - V	
SAWAGS	115m(Exist) - 91m (new) = 24	W x 28601715 = 68.6 KWH/4R
LCL SAVIN	45 = 68.6 K-H/4R x 30.07454/km	X 11.70 NPW +
	s ozthwx tok.bo	
	= 88.80 WHICH IS LESS -	THE 2-LAMP BALLAST OST.
	A CONTRACT OF THE PROPERTY AND A CONTRACT OF THE PROPERTY OF T	

FORM 101-1/8

Keiler & Gannon

Engineers-Architects

COMPUTED BY RCL	IMPROVE POWER FACTOR	PROJECT 16-403-10
CHECKED BY	ECO # 78	SHEET NO. 1 OF 13 SHEETS
REV		SHEET NOOFOFSHEETS
DESCRIPTIN OF AC	.T10N	
		CAPACITORS IS CONSIDERED
For Two Girling	L CONDITIONS: (1) INSTAUL	ATIA AT THE
MAIN UTILITY	METERING POINT AND (2) IN LOCATION AT THE MAIN	NSTALLATION AT EACH IMPUNDMALL SERVICE POINT WILL
REDALS BILLING PER	MALTIES ONLY AND NOT IMPR	OVE LUAD CAPABILITIES
OF THE DISTRIBUTION	n system. Installation	U AT INDIVIONAL MOTORS
WILL FREE UP SYST	EM CAPACITY BY REDUCING	THE AMOUNT OF
1	ENT DRAWN KROW THE W	
(1) INSTALLATION O	e pate metering point -	SAVINGS CALLILLATIONS
DATA & ASSUMPTIONS	;	
A. PG4E RATES	SCHEDULE A-20 INCLUDES	A 0.06% ADJUSTMENT
ON THE TOTAL FROM 85%.	L BILLING FOR EACH 1% POV	wait lucture Oli-Laira ner
· ·	and Post BILLINGS: GOO, OUD ?	Sup of Cinmin District.
	DARING MINIER PERIOD	3411.4
· ·		e e e e e e e e e e e e e e e e e e e
C. AVERAGE P	mar Period - 82/83%	
ļ.	mar Period - 85/86%	· · · · · · · · · · · · · · · · · · ·
1. Summer PE	TAK DEMAND - 3,160 kW	

CALGULATIONS:

a. PEAK KUAR (EXISTING) = - AN. TAN (COC-1.825) = 3,160 KWX TAN (34.41°)

= 2,165 KVAR

6. PEAR LIAR CHARECTED TO 95%)

= 3,160 kW x TAN (COST .95) 3,160 kW x TAN (18.19°) 1,039 kVAR

Keller & Gannon

Engineers-Architects

COMPUTED BY Ra	IMPROJE POWER FACTOR	PROJECT 13 403-10
CHECKED BY	Eco #D8	
REV. Jame 1993		SHEET NO. 2 OF 13 SH. S

* ASSUMING CORRECTION TO AN AVERAGE PIF OF 95%

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NEW LOSS

12R(w)

10

23

38

SAVINGS

WATTS

21

36

57

LOSS

ILR (W)

17

35

57

RESISTANCE

רמייולער.

1.620

1.620

1.620

COMPUTED BY RU	IMPRINE PONER FACTOR	PROJECT 16-403-16
CHECKED BY FEBRUARY 1993	E COT D8	
REV. 74- 1913		SHEET NO. 3 OF 13 SHEETS

(2) INSTALLATION OF P.K CHROSETTON CAPALITORS & MOTOR LOADS

ANNUAL KWH SAVINGS DNE TO A REDUCTION IN MOTOR CIRCUIT I'R LOSSES ARE ESTIMATED AS FOLLOWS (SEE NOTES):

FLAR

460 v

7.6

11

14

CURRENT

22

20

18

MAX KUNR

2.5

3

HP RATING

5

7.5

10

REDUCTION %

15	5	18	21	1.018	81	54	78
20	6	17	27	0.640	84	58	78
25	75	17	34	0.640	133	92	123
30	8	16	40	0.410	118	83_	102
45	15"	16	52	0.410	200	141-	ורו
50	17.5	15	65	0.259	197	142	165
60	20	15	77	0.164	175	126	147
75	25	14	96	0.129	214	158	168
HP RATING	MAX KYAR	CURRENT, REDUCTION %	FLAC 2000	RESISTANCE JZ/ 1000'	I 2 R LKS EXIST.	IN WATTS NEW	SAVINGS WATTS
2	ļ	24	7.8	1.620	18	10	24
3	1.5	23	[1	1.620	35	21	42
5	2.5	22	17.5	1.620	ક્ષ્વ	54	105
7.5	3	20	25	1.018	115	73	126
10	4	18	32	0.640	118	79	117
15	Ś	18	53	0.410	207	140	201
20	ż	17	68	0.259	215	149	201
25	7.5	17	85	0.259	3 37	232	315
33	Š	16	100	0.102	272	206	158
40	15	16	130	0-129	312	277	345
Şs	17.5	15	163	0.081	387	280	321
63	25	15	193	0.064	429	310	357
75	25	14	240	0.043	446	330	348

Keller & Gannon

Engineers-Architects

COMPUTED BY RCL	IMPROVE POWER FACTOR	PROJECT 16-403-10
CHECKED BY	ECO # D8	
DATE 19 13 REV. 1993		SHEET NO. 4 OF 13 SHEETS

ASSIMPTIONS:

- 1. KVAR VALUES BASED ON RAISING FULL LOAD POWER FACTOR
 TO APPROX 95%.
- 2. MOTORS ASSUMED TO BE NEMA DESIGN B, T-FRAME, 1800 RPM
- 3. RESISTANCE OF MOTOR LIRCUIT ASSUMES COMPLETOR SIZED AT 125% OF FALL LOAD AMPS AND A LENGTH OF 180 FEST.
- 4. INSTIR CIRCUIT SAVINGS IN WATTS = (EXST LER NEW IZR) X 3

SCREENING ANALYSS - 460V MOTORS

	70	1632 1710 111	711215 3 101		1	1
HP RATING	KVARZ	KW SAUMGS	LABOR UST	MAT'L COST	TOTAL INVEST!	BREAKEVEN OP HONRS
5	2.5	0.021	95	270	588	24,490
7.5	3	0.036	95	280	604	14,130
10	4	0.057	95	300	636	8,940
is	5	0.078	120	320	708	7,02
20	6	5.078	120	340	740	7,400
25	7.5	0.123	120	355	765	4,380
30	8	0.102	120	370	789	5,780
ño_	15	0.177	120	485	974	3,720
· 55	175	3.15	175	515	1,062	4,580
Ğ٥	20	0.177	145	sto	1,103	5,565
75	25	0.168	145	کاه ن	1,208	5,280

1 INVESTMENT = (LABORT 1.08x MATIL) x 1.90x 1.01 x 1.10 x 1.115

21 BREAKEVED OF HOMES / TEAR = TOTAL INVESTMENT - RW SAVINGS X 108.60/2 x 13.5 KW SAVINGS X 8 0.07454/kwH x 14.53

Keller & Gannon

Engineers-Architects

COMPUTED BY RCL	IMPROJE POWER FACTOR	PROJECT
CHECKED BY		
DATE FEBRAARY 1993		/ 12
REV		SHEET NO. <u>5</u> OF <u>13</u> SHEETS

SCREENING ANALYSIS - 2004 MOTORS

HP RATING	KUAR	KW SAUMIS	LABOR LOST	MATLOST	TOTAL INUST. !! WISIOHOUSEN	BREAKEVEN? OP HOURS/YR
2	ŧ	0.024	85	240	523	18,760
3	1.5	0.042	85	275	580	11,390
5	2.5	0.105	115	345	740	5,145
7.5	3	0.126	115	360	7.65	4,24
10	4	0.117	13ã	380	820	4,675
15	5	0.201	130	400	853	2,555
20	6	0.201	130	420	885	2,700
25	7.5	0.315	150	465	9 90	1,540
30	8	0.258	150	500	1,046	2,380
40	15	0.345	180	765	1,521	2,710
50	17.5	0.321	200	860	1,706	3,545
60	20	0.357	215	920	1,827	3,520
75	25	0.348	235	1,100	2,149	4,340

11 THYESTMENT = (LABOR + 1.08x MATY) x 1.30 x 1.01 x 1.10 x 1.115

21 BREAKEVEN OP HOWRS / YEAR = TOTAL INVESTMENT - KW SAVINGS X 108.60/EW X 13.50 KW SAVINGS X * 0.07454 X 14.53

LIFE CYCLE CUST ANALYSES FOR MOTOR INSTALLATIONS MEETING
THE MINIMUM BREAKENEN HOMES/ YE ARE DEVELOPED IN THE
JEOLIOWING SPREADSHEET

Keller & Gannon

Engineers-Architects

COMPUTED BY REL	IMPROVE POWER FACTOR	PROJECT FT. HUNTER LIGGETT
CHECKED BY		
DATE		SHEET NO. 6 OF 13 SHEETS
REV 19		SHEET NO OF SHEETS

CAPACITURS INSTALLED AT MOTOR LUAD

BUILDING	SUPPLY		RE	RETURN TOTAL		MSAGE	Kmit
Parcolnal	·-HP·	KM ZAVINGS	HP	KMSAVINGS	savags Savags	HRSITE	SAUNAS
205	25	0.315	10	0.117	6.432	5,840	2,523
206	20104	5.114			-0-1-4	7,300	832
20.7	25	0.315	10	0.117	0.432	5,840	2,523
208	25	0.315	1.5	6.117	0.432	~2,8 HD	2,523
210	10	0.117	-		6.117	8,760	1,025
229	25	0.315	10	0.117	0.432	5,840	2,523
230	25	0.315	10	0.117	0.432	5,840	2,523
				· · · · · · · · · · · · · · · · · · ·		·	
				. . . 			-
					2.277		13.640

II 460 V MOTORS; ALL OTHERS ARE 200 V MOTORS

ANNAL DEMAND SAVINGS = 27277 KW × 108.60/1W = 247

ANNUAL MBTH SAVINGS = 13,640KWH x ,003413 MRTM/ KWH

= 46.6

Rev 6/43

CONSTRUCTION COST E	STIMAT	ΓE		DATE PREPARED FEBRUARY	1993		7 of 13
PROJECT				· .	BASIS FOR ESTIMATE		
EEAP LIMITED ENERLY	STUD	`		PRIJ. NO. D8	兹	CODE A (No design	completed)
LOCATION FURT HUNTER LIGHET	T, CAI	AIS R	AIA	•	_	DE B (Preliminary d	
ARCHITECT ENGINEER KELLER & GANNON					□ o T1	HER (Specify)	
DRAWING NO.		ESTIM	ATOR	RCL	1	CHECKED BY BI	Н
		<u></u>			<u> </u>	ATERIAL	
POWER FACTOR CORRECTION	QUANT	UNIT	PER	TOTAL	PER	TOTAL	TOTAL COST
AT PGHE METERING POINT	UNITS	MEAS.	UNIT	TOTAL	UNIT		
		<u> </u>					
1200 KUAR, 12KV				· ·	 		
PADMOUNTED CAPACITAR							
BANK INCLUDING INCOMING							
LINE SECTION AND CAPACITUR							
Switch , way	_	LS	-	4,000		23,000	27,000
CONCRETE PAD & SITE							
WORK		LS		800	-	200	1,000
		<u> </u>	ļ		_		
FEEDER TO PG48					ļ		
METETERIA LOCATION	30	LF	25	750	20	600	1,350
				·			
·			 				
QUOTATION FROM LGE			ļ				
electrical Sales, Inc.							
FIR ABB BRING BUIER					<u> </u>		
EQUIPMENT DATED 2/8/93							
					<u> </u>		
					<u> </u>		
SUBTOTAL				5,550	<u> </u>	23.800	29,350
GEN CONOTTOISE 8%			-	-	-	<u> </u>	2,348
SURTOTAL			<u> </u>	-			2,348 31,698 9,509
CONTRACTOR OH & PROBIT BEOT			-				9,509
CUBTOTAL		<u> </u>	<u> -</u>				41,207
BOND @ 19.					1		412
SUBTOTAL							41,619
ESTIMATING CONTILGENITION			_				4,167
TOTAL CONSTRUCTION COST			_	-			45,781
						* U.S. GOVERNMENT PR	

CONSTRUCTION COST ESTIMATE					TINE 1993 SHEET 8 OF 13			
PRO 15 CT					BASIS FOR ESTIMATE			
EEAP LIMITED ENERG	94 ST	ABY	Pr	702 D8	1	CODE A (No design		
LOCATION FORT HUNTER LIGGETT,	LA.				I —	DE B (Preliminary d] CODE C (Final dea	-	
ARCHITECT ENGINEER					1	HER (Specify)		
KELLERY GANNON DRAWING NO.		ESTIM	ATOR		l	CHECKED BY	-)	
		<u> </u>		Ral	BiH			
P.F. Cornection	QUANT		PER	LABOR	PER	MATERIAL	TOTAL	
@ INDIVIDUAL MOTORS	NO. UNITS	MEAS.	UNIT	TOTAL	UNIT	TOTAL	COST	
1. Y KNAR CAPACITUR	5	EA	130	650	380	1,900	2,550	
2. 7.5 KVAR LAPAZITOR	6	ÉA	150	900	465	2,790	3,690	
	-							
				1,550		4690	6,240	
SURTOTAL.				(, 2)			499	
GÉNERAL CONDITIONS & 8%							6,739	
SUBTOTAL								
CONTRACTOR OH 4 PROFIT & 30%		-			-		2,022	
SUBTLITAL							3,761	
BOMD & 1%		-					38	
SURTITAL		-					8849	
ESTIMATING CONTINGENT COT							885	
TOTAL PROBABLE								
CANSTRUCTION COST							9,733	

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT HUNTER LIGGETT CA REGION NO. 4 PROJECT NO. D8
PROJECT TITLE: IMPROVE POWER FACTOR FISCAL YEAR DISCRETE PORTION NAME: POWER FACTOR CORRECTION AT PGANOE METERING POINT
ANALYSIS DATE: June 93 ECONOMIC LIFE 20 PREPARER KELLIC SANNON
ANALISIS DATE: JANE 75 ECONOMIC LIFE ZO PREPARER NOTICE LIFE ZO
1. INVESTMENT COSTS: A. CONSTRUCTION COST B. SIOH \$ 45.781 \$ 2,518
C. DESIGN COST \$ 2,747
D. TOTAL COST (1A+1B+1C) \$ \$1,046
E. SALVAGE VALUE OF EXISTING EQUIPMENT \$
F. PUBLIC UTILITY COMPANY REBATE \$ \$ 51,046 G. TOTAL INVESTMENT (1D-1E-1F) \$ 51,046
G. TOTAL INVESTMENT (ID-TE-TF)
2. ENERGY SAVINGS (+)/COST(-): DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS 16/92
ENERGY COST SAVING ANNUAL \$ DISCOUNT DISCOUNTED
SOURCE \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5)
A. ELEC \$ \$
. DIST \$ \$
C. RESID \$ \$
D. NG \$ \$\$
E. PPG \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
F. COAL \$
G. SOLAR \$\$\$
H. GEOTH \$ \$\$
I. BIOMA \$ \$\$
J. REFUS \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$
K. WIND \$ \$
L. OTHER \$ \$ \$
M. DEMAND SAVINGS \$\$
N. TOTAL S S Ø
3. NON ENERGY SAVINGS (+) OR COST (-):
A. ANNUAL RECURRING (+/-) \$ 6,480
(1) DISCOUNT FACTOR (TABLE A)
(2) DISCOUNTED SAVINGS/COST (3A X 3A1) \$ 88,063
·
B. NON RECURRING SAVINGS (+) OR COST (-)
ITEM SAVINGS(+) YEAR OF DISCOUNT DISCOUNTED SAV-
THE SAYINGS (*) THE OF PLANT PLANTS SAYING SAYING S
- COST(-)(1) OCCUR. (2) FACTOR(3) INGS(+)COST(-)(4)
~ ~ ~ ^
a \$
b \$
a.
d. 101AL \$
C. TOTAL NON ENERGY DISCOUNTED SAVINGS (3A2+3Bd4) \$ 88.063
4. SIMPLE PAYBACK 1G/(2N3+3A+(3Bd1/ECONOMIC LIFE)): 7.88 YEARS
5. TOTAL NET DISCOUNTED SAVINGS (2N5+3C): \$ 88.063
6. SAVINGS TO INVESTMENT RATIO (SIR) 5/1G: 7. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 6.89 z

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT HUNTER LIGGETT CA. REGION NO. 4 PROJECT NO. D8
PROJECT TITLE: IMPROVE POWER FACTOR FISCAL YEAR DISCRETE PORTION NAME: POWER FACTOR WORRECTION AT INDIVIOUAL MOTORS
DISCRETE PORTION NAME: POWER FACTOR CONCRECTION AT LABORITORIAL PROTORS
ANALYSIS DATE: June 93 ECONOMIC LIFE 20 PREPARER KELLER & GANNON
1. INVESTMENT COSTS: A. CONSTRUCTION COST \$ 9 733 B. SIOH \$ 535 C. DESIGN COST \$ 594 D. TOTAL COST (1A+1B+1C) \$ 10, E. SALVAGE VALUE OF EXISTING EQUIPMENT \$ 6 F. PUBLIC UTILITY COMPANY REBATE \$ 6 G. TOTAL INVESTMENT (1D-1E-1F)
2. ENERGY SAVINGS (+)/COST(-): DATE OF NISTIR 85-3273-X USED FOR DISCOUNT FACTORS 10/92
ENERGY COST SAVING ANNUAL \$ DISCOUNT DISCOUNTED SOURCE \$/MBTU(1) MBTU/YR(2) SAVINGS(3) FACTOR(4) SAVINGS(5)
A. ELEC \$ 21.84
(1) DISCOUNT FACTOR (TABLE A) (2) DISCOUNTED SAVINGS/COST (3A X 3A1) \$
B. NON RECURRING SAVINGS (+) OR COST (-) ITEM SAVINGS(+) YEAR OF DISCOUNT DISCOUNTED SAV-
· COST(-)(1) OCCUR. (2) FACTOR(3) INGS(+)COST(-)(4)
a\$
4. SIMPLE PAYBACK 1G/(2N3+3A+(3Bd1/ECONOMIC LIFE)): 5. TOTAL NET DISCOUNTED SAVINGS (2N5+3C): 6. SAVINGS TO INVESTMENT RATIO (SIR) 5/1G: 7. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 6. SAVINGS TO INVESTMENT RATIO (SIR) 5/1G: 7. ADJUSTED INTERNAL RATE OF RETURN (AIRR): 6. OF RETURN (AIRR):

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: FORT HUNTER LIGHETT TA	region no. + project no. D8
PROJECT TITLE: IMPROVE POWER KALTOK	FISCAL YEAR
DISCRETE PORTION NAME: TO TAL PROTECT	
ANALYSIS DATE: June 93 ECONOMIC LIFE	20 PREPARER KELLER & GANNON
1. INVESTMENT COSTS: A. CONSTRUCTION COST \$ \$\frac{5\cap5}{3\cap5}\$\$ B. SIOH \$ \frac{3\cap5}{3\cap5}\$\$ C. DESIGN COST \$ \frac{3\cap5}{3\cap5}\$\$ D. TOTAL COST (1A+1B+1C) \$ \frac{6\cap1\cap97\cap3}{6\cap1\cap97\cap3}\$\$ E. SALVAGE VALUE OF EXISTING EQUIPMENT F. PUBLIC UTILITY COMPANY REBATE G. TOTAL INVESTMENT (1D-1E-1F)	\$
2. ENERGY SAVINGS (+)/COST(-): DATE OF NISTIR 85-3273-X USED FOR DISCOUNT	
ENERGY COST SAVING ANNUAL \$ SOURCE \$/MBTU(1) MBTU/YR(2) SAVINGS(3)	
A. ELEC \$ 21.84 46.6 \$ 1,018	14.53 s 14,792
. DIST \$ \$	<u> </u>
C. RESID \$ \$	<u> </u>
D. NG \$ \$ E. PPG \$ \$	\$
E. PPG \$ \$ F. COAL \$ \$	
G. SOLAR \$ \$	\$
H. GEOTH \$ \$	\$\$
I. BIOMA \$ \$	\$
J. REFUS S S	\$
K. WIND \$\$	\$
L. OTHER \$ \$	\$ 3,593
N. TOTAL \$ 1,265	\$ 18.381
3. NON ENERGY SAVINGS (+) OR COST (-):	·
A ANDTAL RECERPTION (1/) C (-490	
A. ANNUAL RECURRING (+/-) \$ 6,480 (1) DISCOUNT FACTOR (TABLE A)	13.59
(2) DISCOUNTED SAVINGS/COST (3A X 3A1)	s 88,063
(-, -, -, -, -, -, -, -, -, -, -, -, -, -	·
B. NON RECURRING SAVINGS (+) OR COST (-)	
ITEM SAVINGS(+) YEAR OF D COST(-)(1) OCCUR. (2) F	
a.	\$
c	\$
d. TOTAL \$C. TOTAL NON ENERGY DISCOUNTED SAVINGS (3A	2+3Bd4) \$ <u>88,063</u>
4. SIMPLE PAYBACK 1G/(2N3+3A+(3Bd1/ECONOMI	C LIFE)): 8.60 YEARS \$ 106,444
5. TOTAL NET DISCOUNTED SAVINGS (2N5+3C): 6. SAVINGS TO INVESTMENT RATIO (SIR) 5/1G:	
7. ADJUSTED INTERNAL RATE OF RETURN (AIRR)	



PAD MOUNTED CAPACITOR ASSEMBLIES

Metal Enclosed Capacitor Assemblies Pad Mounted 5 and 15kV Class

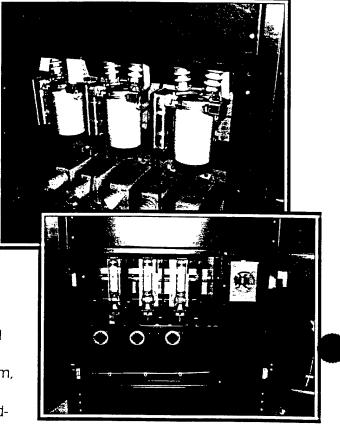
Pad Mounted Capacitor Assemblies to meet maximum kVAR requirements, while maintaining aesthetic concerns, are available from ABB. These low profile, economical units are provided for both 5kV and 15kV class applications. Pad Mounted Capacitor Assemblies will help to correct poor power factor and reduce demand on substation transformers.

General Features

Rugged 11-gauge steel, finished with two coats of baked enamel, make the enclosures sturdy, weather resistant and attractive. Available in a bolted or welded construction, these units offer front and rear door access, (dead-front) barriers, and a 3-point latching system, with means for padlocking, to insure security. Other standard enclosure features include non-corrosive hardware, ventilation, lifting provisions and a domed roof.

Typically, these assemblies are (60"H x 60"W x 60"D) and will meet a wide range of capacitor application needs. Capacitors can be standard or inverted mount to allow for oil or vacuum switching arrangements, bushings, continuous ground bus, and individual or group fusing.

Various options are available such as key interlocks, control power transformer, pentahead bolts, and custom controls. All Pad Mounted Capacitor Assemblies are designed and built in accordance with applicable ANSI, NEMA, and IEEE standards.



- Compact Design
- Economical
- Rugged Construction
- Tamper Resistant
- Available Through 2400 kVAR





FACSIMILE PUR

Receiving Location: Kellar & Gangal	
Facsimile Number:	
Attention: Dick Leawick	
From:	
Number of Pages in This Transmission: Date: Date:	
Subject: ABB FOD Mounted CADARITED FOONKS	
Based on our prenous plane conversations, a bidget passe for a 1200 kvarz outdece Pas mounded CAP. Bank would be \$23,000.	
a bidget paice for a 1200 KVAR2 extrace	
Pas mounded CAP. Frank would be #23,000.	
This includes an incoming has section and under a copacitor section with copacitor SwiTCHING.	:
a copacitor Section with capacitor SwiTCHING,	
Approx. dimensions are 90" HX 120" W X 60" De Wisth May be decreamed depending on incom. Line requirements	
WISTH MIL be decreased depending on incomi	25
Line repuirements	<u>a</u>
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Platte call if you have any quartime.	
Doug Conten	

1330 S. Bascom Ave., Ste. F - San Jose, CA 95128 • (408) 293-0755 • Fax (408) 293-0419

Σ	Keller	&	Gannor	1

Engineers-Architects

COMPUTED BY Re-	REPLACE MOTORS WITH	PROJECT 16-403-10
CHECKED BY	HIGH EFFICIENCY UNITS	
REV. JUN€ 19 93	ECO# D9	SHEET NO. 1 OF 2 SHEETS

DESCRIPTION OF ACTION

THIS PRUTECT WOULD REPLACE EXISTING STANDARD - EKALLINKT MUTIRS WITH PREMIUM EXFELIENCY WHITS TO GENERATE BUTH INH AND KW DEMAND SAVINGS.

HOURS/YR OPER, REG'D FOR
REPLACEMENT TO BE JUSTIFIED:

Screen	REPLACEMENT TO BE JUSTIFIED:							
Mominal Lominal	Γ% ET STD.	PREMIUM I	LABOR"	MATIL CUST 3	TOTAL LUST 31	PG+E REBATE	TOTAL INVEST, 4	Breakenen op huns/year
	75	82.5	80	205	485	30	455	106,100
2	79	84.	80	275	607	40	567	
3	81	875	80	320	685	40	645	
\$	82	87.5	80	385	798	_50	748	54,330
7.5	84	895	85	480	971	60	911	
10	85.	89.5	90	590	1,171	70	1,101	
15	86	91.0	110	825	1,162	85	1,077	
20	87	91.0	135	1000	1,956	100	1,856	50,780
25	88	92.4	140	1305	2,705	120	2,585	
30	89	92.4	150	1,550	2,937	140	2,797	
40	89	93.0	175	2,030	3,812	160	3,652	
50	89	93.0	220	2,285	4,327	180	7.147	47,540
63	89	93.6	250	3545	6,567	180	6,387	- ·· - · - · - ·
75	90	94.1	295	4,145	7.682	200	7,482	-
100	90	945	. 380	5,830	10,749	250	10,449	
125	90	94.4	495	6,850	12,708	350	12,358	
150	91	95.0	580	8,025	14,888	450	14,438	58,000

II NEMA NOMINAL EFFICIENCY FOR 1800 ROM, TEFC MOTOR

^{21 75%} X LIST PRICE FOR BALDOR SWPER-E

³¹ TOTAL LOST = (LABOR LOST + 1.08 x MATILLUST) X 1.30 x 1.01 x 1.10 x 1.115

I TOTAL INVESTMENT = TOTAL COST - PG+= REBATE

SI BREAKEVEN = THAL INVEST - (HPX.746x PCTG. LOAD X 108.60/kW) X (STD EAF. PREMEFF

OP HOMES/YR

HPX.746x PCTG. LOAD X 2.06223/km X (100 - 100

WHERE PCTG. LOAD = .75

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COMPUTED BY RCL	REPLACE MOTORS WITH	PROJECT 16-403-10
CHECKED BY 1993	HIGH EFFICIENCY UNITS	
DATE	ECO#D9	SHEET NO. 2 OF 2 SHEETS

THUS, REPLACING EXISTING OPERATING STANDARD - EFFICIENCY MOTORS
WITH PREMIUM - EFFICIENCY MNITS IS NOT COST EFFECTIVE.

THE SUCREMENTAL CUST OF REPLACING FAILED MOTORS WITH PREMIUM EFFICIENCY RATHER THAN STANDARD - EFFICIENCY WITS IS TUSTIFIED IN MOST
CASES SINCE THE ENVICTMENT REGIMED IS ONLY THE ADDED LOST
UP THE PREMIUM EFFICIENCY MOTOR. PEOF REBATES REDUCE THE
COST EVEN FARTHER, FOR EXAMPLE:

Numinal	premium motor cost	STANDORD MUTUR CUST	COST DIFFERENCE	Ph 4 & RUBATE	INUCLIMENT	•
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20	Geo.	800	200	100	100	
50	2,285	ハファン	5 10	180	330	

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	Engineers • Architects	a construction of the cons			and the second s
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وسعثم تشريب

TO: KELLER & GANNON

PHONE: (415) 431-5528 FAX (415) 431 6430

BUZZELL ELECTRIC WORKS SINCE 1909

130 EIGHTH STREET

07-10-92 08:20AM P001 #24

DATE SENT: 10

PROJECT No .: ___

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Engineers-Architects

COMPUTED BY RCL	EMLS FEASIBILITY	PROJECT_16-403-10
DATE MARCH 1993 REV	Non-H Di-	SHEET NO OF 3 SHEETS
19	ECO# D10	SHEET NO OF SHEETS
DESCRIPTION OF AC	Tion	
CONTROL SYSTEM (E FACILITIES AT FOR- OF OFF-THE-SHELF PROGRAMS, INSTRUM	T WOULD INSTALL AN ENGINES) FOR THE MAJOR ENGINEER LIGGETT THE MICROCOMPUTERS AND PERIPMENTATION, CONTROL EQUIPMENTATION, CONTROL EQUIPMENTATION, SYSTEM.	HERRY - CONSUMING SYSTEM WOULD CONSIST HERRY DEVICES APPLICATIONS
THE SYSTEM DESCRIBED IN TM	EVALUATED IS BASED ON 5-815-2.	THE METHODOLOGY
THE FOLLOWIN	G EMCS APPLICATIONS PRO	GRAMS ARE CONSIDERED
FIR FORT HUNTER LI	44617:	
E-6 SCHEDULED S	TART/STOP	
B-18 . OPTIMUM STAN	17/570P	
B-1 • DUTY CYCLING		
	TER CHANGEOVER (OHM SAVINGS	044)
E-6 DAY NIGHT 3	ETBACK	
13-11 • ELMOMIZER		
- Indiana and a second		
* · Citium water	N. P.ESET	
	22 (2004) 1	
B-5 · HOT WATER	DUTSIDE AIR RESET	
13 - DEMAND LIM		
* BOILER MONIT	ORING CO & M LABOR SAVINGS	0454)
ENERGY SAVIN	GS ACHIEVARUS BY MOST OF	THE ABOVE LISTED
APPLYATIONS PROGRAMS	CAN ALSO BE OBTAINED B	Y LOCAL CONTROL RETROPITS
ENERGY SAVINGS FOR	THESE LOLAL RETROFITS W	ILL BE USED IN THIS
- EMCS ANALTSIS , WHER	LE APPLICABLE ANALYSES	OF LOCAL CONTROL RUTROFITS
	THE FOLLOWING ECO DESI	
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BS INSTAU	DINTSIDE AIR TEMPERATING R	AS ST

FORM 101-1/8

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COMPUTED BY RUL	Emcs FEASIBILITY	PROJECT_16-403-10
CHECKED BY		
DATE MARCH, 1993		7 34
REV 19		SHEET NO. 2 OF 34 SHEETS

B6 INSTALL TIME CLOCKS

BT PROVIDE NIGHT SETBACK/ SETUP

BII INSTALL ECONOMIZER CYCLE

BIG ANTOMATE SummER/WINTER SWITCHOVER

INPAT/ DUTPUT POINT SUMMART

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FORM 101-1/8

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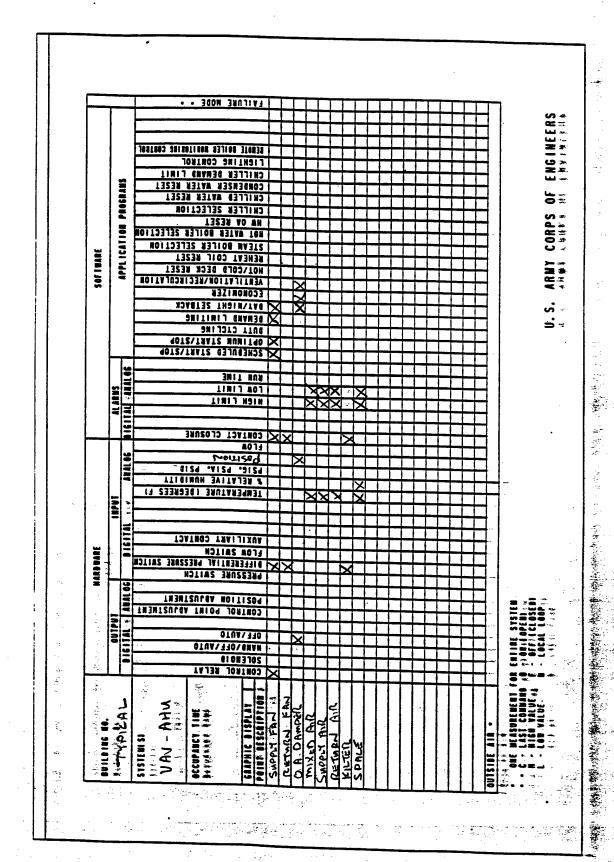
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SHOMARY OF EMCS MONITORING & CONTROL POINTS

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No.	System	Quan.	SPACE TEMP	OULT TEMP	LIGUID Tamp	Krow, LIGAID	POSITION	Ozsensbar		-	PRESSURE SWITCH	D. P. Switch, A.R.	AUX. GANTACT	CPA			CONTRALLER D/R	CONTROL RELAY	-
579 P80	ELEC UNIT HEATER HW BOILER SINGLE ZONE DX AHN ELECTRIC DHW HERTER		1	1 3	5.1	2	-	1	~		1	3	3 . 1.				1	2	③ ③
P\$(AIR COOLED DX COMPR. HW BOILER SINGLE ZONE DX AHA AIR LEGGED DX LOMPR. ELGGERIC DHW HTR	1 2	,	3	5	2	 		-		-	3	2 3 2 2	 1	7. 1				(<u>1</u>)
Piol	HW BOILER SINGLE ZONE AHM AIR LOULED CHILLER ELECTRIC MINT HTR	1 1 30		1 3	ς ι	2					-	3	3	 	-	-	T	٦	(a)
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Fi20	SINGLE ZONE DX AHM WAREN ARE KURNALE DHOW CIRL PHIMPS PROPANE WAT HIR	2 2	Present Lines 8	6 2			-				2 00 (8)	6 2		 			2	レンシー	3)

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BLOY No	System Type	Quan.	Space Temp	DUCT TEMP	LipuiD Tamp	Krow, LIGNID	POSITION	Oz Sensur			PRESSURE SWITCH	D. P. SWITCH, AIR	ANK. CANTACT	GPA .			CONTRACTAR O/R	CONTROL RELAY	-
T121	SINGLE ZONE DX AHA AIR WOLED DX WMP- ELECTRIC DHW HTR	1	1 	3				-		-		3	2 1		-	-			ભ
5144	PRUPANE MINIT HTR	4	1_										4				-	4	!
S146	WARM AIR KARNACE	1.	1	2								2	1					2_	0
T156	Electric Daw HTR	,	-								_	-	1,	 				1	0
TIS8	<u>.</u>	·	-						-										
T161	WARM AIR FARNALE AIR LOCKED DX LAMP	2	2	4				_			1-2	4	2.					ተ ረ	22
T162	MARM AND KNOWACE	2 2	2_	+				-		-		7	٧ +				-	4	22
S168				·								-					-		
7172	_			-	-		_				-			 -					_
ררום	SINGLE ZONE DX AHA AIC. DX COMPRESSOR	1	Ľ	3								3	2			ş.	T		(1)
₽17 %	WARM AIR KNRWARE A.C. DR COMPRESSUR DHW CIRC. PHMP	2 2 1	2_	4	-		_				1	4	2 4			-	- - - - -	4 2	ભ

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Summary	0 F	EMCS	MONITORING & CONTROL POINTS
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No.	SYSTEM TMPE	Quan.	Space Temp	DUCT TEMP	LIGUID Temp	Krow, LIGNID	POSITION	Oz Sensar	RH		PRESSURE SWITCH	D. P. Switch, AIR	AUX. CANTACT		CPA			CONTRALLER O/R	CONTROL RELAY	
5182	SINGLE ZONE DX AHU AIR WOLL DX COMPR. ELECTRIC DAW HTR	2 2 1	2	6		-				-		6	4		-			٤	ン 2 1	(<u>)</u>
S186	SINGLE ZONE DX AHA AIL DX COMPR	۱ ۲ - ۲	1	3			-				1 1 1 1	3	2	-					T	(L)
P190	HW BOILER SINGLE ZONG DX AHM A.C. DX WMP. ELECTRIC DAW HTR	- ~ ~ -		3	\$	2						3	3 2 1	-		-		l_	2 [3
P197	SINGLE ZONE DX AHLA A.C. OX LOMP ELECTRIC BHOW HTR	1	Į -	3		-			 			3	2		-	-		1	1	િ
S148	warm air knowld	١	1	2							-	2_	ı						٤	(
PZOS ¥ PZOSA	DWAL DUCT AHM SINGLE ZUNE DX AHM AIR LAULED CHILER HW BULLER A.C. DX COMPRESSUR DHW CIRC. PAMPS ELECTRIC DHW HTR	1 1 1 2 1	1	3	19		2		14		Ĺ 2	3	2 3 2	-	2				1 1 2 1 2 1	(६१)

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SUMMARY OF EMCS MONITURING & CONTROL POINTS

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BLOY No	system Type	Quan.	SPACE TEMP	OUCT TEMP	Liguid Tamp	FLOW, LIGHID	POSITION	Oz Sensar	R.H.	Priessure Switch	D. P. SWITCH, AIR	AJK. CANTACT	CPA			CONTRALLER OFR	CONTROL RELAY	-
P206	HW BOILER SINGLE ZOME DX AHA A.L. DX CAMPRESSIR ELECTRIC DHW HTR	2 2 1	2	26	10	4		2		 2	G	6 4 1				2	4 2 2 1	(J
P207 † P207A	HEW ROLLER DUAL DUCT AHM SINGLE ZUNE DX AHM ALL BY COMPRESSIVE ELECTRIC DHW HTR DHW CIRC PNUMPS	1 1 1 2	14	3	5 19	2	2		14	2	3	3 2 1	2				211112	&
P208 4 P208A	HW BOILER DUAL DUCT AHM SINGLE ZONE DX AHU AIL DX COMP. ELECTRIC DHW INR. DHW CURC PHINDS	1 1 1 2	14	3	5	2	2		14	2	3 3	3 2 1	2				2 1 1 1 2	©.
Pzo4	HW BOILER SINGLE ZUME DX AMA A.C. DX COMPRE ELECTRIC DITH HTTR	1	. 1	3	\$	2					3	3				1	2 1 1 1	

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SUMMARY OF EMCS MONITOR, NG & CONTROL POINTS

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BLOG.	system Type	QNAN.	SPACE TEMP	DUCT TEMP	LIGUID Temp	Krow, LIGAID	POSITION	Oz Sensar			PRESSURE SWITCH	D. P. Switch, A.R.	AUX. LANTACT		CPA			CONTRALLER DIR	CONTROL RELAY	
S2+1	SIMELY FOLLE DX AHA AIR WOLLED CHILLER ELECTRIC DHW HTR	1	1	3	ł			-	-		l.	3	2		1			ł	1	(5)
PISZ	H.W. BOILER HW WNIT HEATER ELECTRIC OHW HTR	14	1	l	S	2	14	l		-	1		3						ک ا ^ب ا	4
S 283	POWPANG UNIT HEATER HEAT DWMP	3	1										3						3	(3
P287	SINGLE ZONE DX AHM A C. DX COMPRESSOR	1	ł	3								3	2					١	1	<u>(E</u>
S290	SINGLE ZONE AHA : AIR COOLED CHILLER DHW CIRC PUMP	1	1	3							`}	3	2					1	ĺ	(1)
5291	SINGLE BOWL AHM AC DX LUMPROCEOR STERM BOWLER	1	1	3	5	4	ì			-		3	2 3	-				1	7	67
5295	17-W BOILER AIR WILL AMIT FAN WILL MMIT	1 43	1	1	5	~~~		l				-	3 2		· l				2	21

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SUMMARY OF EMCS MONITORING & CONTROL POINTS

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No.	SYSTEM TYPE	фиан.	SPACE TEMP	DUCT TEMP	LIIPAID TEMP	KLOW, LIGNID	POSITION	Oz Sensur	R.H.	PRESSURE SWITCH	D. P. SWITCH, AIR	AUX. CANTACT	CPA			CONTROLUER O/R	CONTROL RELAY	
P210	H w Boiler Air Cooleo Chiller Ahn - Dx A.C. Dx Compressur	1 1	1	3	5 1	2				1 3	`	3 2 2	1			4	2 1 1	3 3
りてに	WARM ATR KARNACE A.C. DX COMPRESSUR	ų L	,	2					-		2	1 2					٤	0
1 ⁷ 224 4 P224A	H.W. BUILEIL DARL DALT AHA SINGLE FUNC DX AHA A.L DX LUMPR. ELECTRIC DHW HTIL DHW LIRC PAMPS	1 1 1 2	14 1	3	5 14	2	2	•	i t	1 2	3	3 2 1	2			1	211112	(&g
P230 † P230A	HW. BUILDR DNAL DUCT AIM SIMPLE BUE DR AIM A.C DR COMP. ELECTRIC DIM ITR. DHW CIRC. PAMPS	1 1 1 2	₹ 1	3	\$ 19	2	2] * 	2	3	- M	2		-		2 1 1 1 2	(S)
2338	VAV AHM ITW. ROILER A.C. DX COMPRESSUR DITM CIRC PROP	1	l.	3	5	2	1	1	1	1	3	3 2				1	1 2 1	(3 <u>1</u>)

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SUMMARY OF EMCS MONITORING & CONTROL POINTS

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BLOG No	system Type	фивы.	Space Temp	OUCT TEMP	LIGUID TEMP	FLOW, LIGAID	POSITION	OzSenstr	R. H. SENSOR	Kw/kwit	Priessurg Switch	D.P. Switch, AIR	AUX. LANTACT		CPA		CONTRALLER O/R	CONTROL RELAY	
P3ol	AHN - DX A.C DX COMPRESSON COMPATER RM AIC	1 1 4	1	3	٥	n:T,	cn	The	- ۱۲	ł		3	2				1	1	હિ
•	KWIKWH - Howard	1								1	-	-		-					and the same of th
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	System Totals		IH.	KŚ	184	34	27	15	71)	36	30	-	-	20		33	Relo	4
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CUECKED BY FILE	ECOD-10 FI
DATE NATION 1913 REV. 19	CHILLED HATER

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DESCRIPTION OF ACTION

PARSE THE CHILLED HATER TEMPERITURE TO FOLLOW THE LOND, HATTHLY OF MEASURE WHETHER THE VALVE IS DIVERSION WALVE TO MEASURE WHATHAR THE VALVE IS FULLY OPEH OR FARTHALY OPEH. ARRANGE THE CONTROL VALVES ARE ENTITE CLOSED OR IN A PARTIALLY OPEH ROSITION (IHOICATIM LIGHT WAS CONTROL VALVES ARE TEMPERATURE SUPPLY SET POINT SHOWN BE RAISED WITHING ONE CONTROL VALVES RETURNED WHAT CONTROL VALVES RETURNED WHEN CONTROL VALVES RETURNED

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128 290

210 295

CALCULATIONS

ENTERRY SAVINGS BASED ON REVISED COP'S GIVEN A

RISE IN ILATER TEMPERATURE

FROM 45 TO 50 FOR DAYS

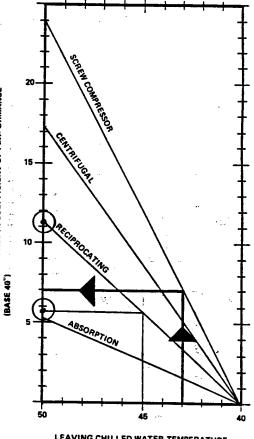
LITER OUTSIDE TEMPERATURES

THE HOUR BO' BUT PELON 92 DO \$

THE ADJACENT FIGURE PROT DOIS.

ELTRAY CONSTITUTON IN EVISTING

CULLDWGS IS USED.



LEAVING CHILLED WATER TEMPERATURE

FORM 101-1/8

Keller & Gannon

Engineers-Architects

				Liginolis Alomosto	
COMPUTED BY_	RUB	Ecoto 9	thice	PROJECT 16-403	-10
CHECKED BY_		l		FIT BEAD	
REV	19	WST SAV	into S	SHEET NO. 24 OF 34	SHEETS
				e en en en en en en en en en en en en en	
Cool	1H9 DEGREE	E DATS @ 93	35° 35°	B	
		<u> </u>	2 D3 = 1,1	<u> </u>	
	AVA ES	WEHLY IMPZ	WEMENT		
+	1101-101	1163-35	-8 3	51	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	11 6 - 6 10	(1153)		
	Chui	iz ENTERTY LI	SEAME SUMI	7/27	16.
acq E	XISTIHY USEAU	e Hew Usergie	SAVITIS	SAVIHAS	
	KWH MEL	(KUH140)	(KHHYR)	\$/42	
-i					
101	2744	2,648		\$17 50	
128	29,186	28,164	1,021	\$ 7600	
210	22,434	23 579	855	\$6400	
241	6,431	15,856	575	\$4300	
290	3,706	3769	137	\$10°°	
295	81379	78,531	2848	\$ 212 00	
6-1-3	51,311	10,301	90-16		
+ + + + +					
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CONSTRUCTION COST	ESTIMA.	ΓE		DATE PREPARED MARCH	1443		SHEET'Z	5 of 74
PROJECT	٠				BASIS F	OR ESTIM	ATE	
EEAP LIMITED ENERGY S	STAUT				_			n completed)
FORT HUNTER LIGHETT, LA	١						reliminary d : (Final des	
ARCHITECT ENGINEER KELLER & GANNON			-		-	THER (Sp	city)	
DRAWING NO.		ESTIM		RU		CHECKE	D BY R	114
ENERGY MONITURING 4	QUANT	ITY		LABOR		MATERIA	L	
CONTROL SYSTEM	NO. UNITS	UNIT MEAS.	PER	TOTAL	PER UNIT	то	ral .	COST
						<u> </u>		
CUST SUMMARY								
CENTRAL LONTAN HARDWARE				1,200		1	8, 176	19,370
SOFTWARE				63,250				63,250
TEST EULIPMENT				_		2	3,006	23,006
REMOTE EMCS COMPONENTS				477,115		591	3,885	1,068,000
DATA TRANSMISSION STSTEM				7,910		19	5,350	18,260
System testing				98,450				98,450
TECHNIAL DOLLMENTATION				49,550			_	49.550
MAINTENANCE CONTRACT				58,000			-	58,000
OPERATOR TRAINING				12,750			1	12,750
		7						
SUBTOTAL				763,225		64	7,405	1,410,636
SALES TAX e 8%.								51,790
SUBTOTAL								1,462,420
CONTRACTOR OHD PROKITE 30%.								. 438725
SURTOTAL								1,901,145
BOMD @ 10%								19,610
SNBTOTAL								1,920, 155
Estimating continuenctelos.								192,015
TOTAL PIWEABLE								
Construction cost								2,112,170
TUTAL LOST - R	שבושאני)						2,100,000
	1.1							

CONSTRUCTION COST	ESTIMA.	TE		DATE PREPARED MARCH H		_	SHEET	6	F 34
PROJECT EEAP LIMITED ENERGY	ヘチャン				BASIS F	OR ESTIM	ATE		
LOCATION							(No desi		eted)
FORT HUNTER LIGGETT, CHARCHITECT ENGINEER	A	-		·			reliminary : (Final de		
KELLER & GANNON						THER (Sp	eclfy)		
DRAWING NO.		ESTIM	ATOR	Ru	· · · · · · · · · · · · · · · · · · ·	CHECKE	S YE D	14	
ENERGY MONITORING &	QUANT	ITY		LABOR		MATERIA	<u> </u>		
LIMTROL SYSTEM	NO. UNITS	UNIT MEAS.	PER UNIT	TOTAL	PER	70	T A L		COST
CENTRAL CONTROL HARDWARE									
						ļ		-	
1. SUDERVISORT LINTROL	1	30				- a	6.00	<u> </u>	0.0-0
CENTER COMPATER (ISM PS/2)		EA.					1,900	1	9,900
2. ALARM & LUGGING PRINTERS	2	EA			660		320	<u> </u>	1,320
3 LINE WHO THONER /NPS		ΕA				1	,250		1,250
# DIAL-AP MODEM		EA					700	ļ	700
5. STREAMING TAPE BACKUP	1.	EA				\ <u>\</u>	(000)		5,000
6 LABIR	40	MX	30	1,200				_	1,200
SUBTOTAL	-			1,200	<u> </u>	18	1170		9,370
SOFTWARE					<u> </u>				
1. COMMAND SOFTWARE	-	LS	-	13,000			-	1	3,000
Z. APPLICATIONS PROGRAMS		LS	-	22,000			-	7	2,000
3. DATABASE GENERATION	1,130	PT	25	28,250			_	7	18,250
SNRTUTAL				63,24,0				, d'	3,250
TEST EUNIPMENT			·						
1. FID SIMULATOR	• 1	ÉA		500		15,	٥٥٥	l	5500
2. PORTABLE KID TESTER		ËA	_	_		7	500		7,500
SARTUTAL				500			500	7	3,000
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CONSTRUCTION COST	ESTIMAT	ΓE		DATE PREPARED MARCH 1	i93		SHEET 7	7 of 34
PROJECT	TIANY				BASIS FO	OR ESTIM	ATE	
EEAP LIMITED ENERLY S	, , ,, ,,					•		completed)
FORT HANTER LIGHETT,	LA				_		reliminary d : (Final dea	
ARCHITECT ENGINEER KELLER & GANNON						THER (Sp		
DRAWING NO.		ESTIM	ATOR	RCL		CHECKE	D BY B	ı }
ENERGY MONITORING \$	QUANT	ITY		LABOR		MATERIA	L	
WHIRDL SYSTEM	NO. UNITS	UNIT	PER	TOTAL	PER	TO	TAL	TOTAL COST
		l .						-
REMOTE EMCS COMPONENTS								
1. REMOTE TERMINAL UNIT (FID)	1 45	EA	480	21,600	6,120	2-	75.400	
Z. SPACE TEMP. SENSOR	114	EΑ	282	32,148	205	7	13,370	-
3. DULT TEMP. SENSOR	155	ΕA	396	61,380	305	7	7,275	
4. SPACE 1 J.A. REL. HUMIDITT	71	ĖΑ	282	20,022	605	7	12,955	
S. GANGE PRESSURE, LIGHID	-	ÉΑ	426		625		-	
6. DIFF. PRESSURE, LIGHID	-	EA	570	-	895		-	
7. FLOW SENSOR, LIRNID	34	ËΑ	480	16,320	1,155	3	9,270	
8. DAMPER/VALUE POSITION	27	ÉA	327	8,829	315		8,505	
9. KW/KWH TRANSONGER	١	EA	267	267	580		580	
10. OXYGEN SENSOR	15	EΑ	282	4,230	750		11,250	
11. PRESSARE SWITCH, LIGHID	36	EΑ	417	15,012	250		9,000	
12. DIFF PROSSING SWITCH AIR	94	EA	297	27,918	145		3,630	
13 AUXILIARY CONTACT	160	EA	285	4,600	85		3,600	
IT CONTROL DOINT ADJ.	20	EA	411	8,220	760		5,200	
15. GNTROLLER DUERRIDE	33	EA	327	10,791	350		11,550	•
16 WINTHOL RELAY	186	EA	270	50,220	90		16,740	
17 LIGNID TEMP	184	EA	840	154,560	340	6	2,560	
SNBTOTAL				477,117		59	०,४४५	1,068,002
1 Inchades RADIO TRANSCENER		ļ						
				·		ļ		
DATA TRANSMISSION STSTEM								·
1. HEADEND TRANSCENER	1	EA	240	240	6500	1	6,500	
2. HEADEND ANTENNA	1	EA	60	60	750		750	
3 RADIO TOWER	1	ÉA	1,260	1,260	1,500		1,500	
4. REMOTE AUTEUNA (a.SUB)	15	ÉA	30	450	280	-	4,200	
5 REMOTE ANTENNA (2.518)	30	ÉA	30	900	80		2,400	
						ļ	<i>,</i>	
SNBTOTAL			1	2,910	}	1 1	5,350	18,260

CONSTRUCTION COST	ESTIMA	TE		DATE PREPARED	1493		SHEET	28 of 32	4 A
PROJECT						OR ESTIM			1
EEAP LIMITED ENERGY	STNO	<u> </u>			l is	CODE A	(No desig	n completed)	
FORT HUNTER LIGGETT,	CA					ODE B (P		_	2
ARCHITECT ENGINEER		· ·			1 -	CODE C		elgin)	To Applicate East
KELLER & GANNON DRAWING NO.		leer 14	ATOR						
		ESTIM	IA I OR	Rcu		CHECKE	D BA B	ЫĤ	臺灣
ENERGY MONITORING \$	QUANT	TTY		LABOR		MATERIA	L		
CONTROL SYSTEM	NO. UNITS	UNIT		TOTAL	PER	то	FAL	TOTAL COST	# # #
	†	t							
Statem testing					 	<u> </u>			See Province Confidence of the Province Confidence of the Confiden
1. FACTURY TEST	-	LS	-	_	_			5,000	- 1 19 - 3
2 FIED TESTING	1,130	PT	65	73,450		-			· ^
	111120	+	100	1 2,750	 	 		73,450	
3. VERIFILATION \$		1.0			<u> </u>	<u> </u>			
ENDARANCE TESTS	<u> </u>	LS	-		-		-	20,000	
SNRTOTAL	ļ	 	ļ <u>.</u>					98,450	1 .5
TECHNICAL DOCUMENTATION									Sign Are.
1. TECHNICAL DATA PKG.		 				<u> </u>			3
		LS			-			3 may 60	
- Lump Sum		 	 	-	ļ			20,000	
- POINT LUSTS	1,130	PT	35	39,550	<u> </u>	<u> </u>	-	39,550	
SURTOTAL								49,550	
MAINTENANCE CONTRACT									3
1. KIRST YEAR MAINTENANCE									- 基
en% of Instauco						 			
EQUIPMENT COST		LS			-			100	
SWBTOTAL		-						58,000	を ない ない ない ない ない ない ない ない ない ない ない ない ない
					 			58,000	
OPERATOR TRAINING									
1. TRAINING SESSIONS		1.6							1
- DED STARENT LIKTS		LS	1 0 2	-	. -		-	7500	
Leie Zimberi (M21)	3	EX	1,750			<u> </u>		5,250	7
SUBTOTAL		≟.	1	÷.				12,750	
		<u> </u>							
		<u> </u>						1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1	* A
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	ji.	1							

Keller & Gannon

COMPUTED BY RCL	Emcs	FEASIBILITY	PROJECT 16-403-10
CHECKED BY			SHEET NO. 29 OF 34 SHEETS

and the second of the second o			
SENSORS & INSTRUMENTATION - UN	IT POINT C	ost Davelopme	NT U
ANALOG INPUTS	MAT'L WST	r LABOR MH	LABOR WST
SPACE TEMPERATURE			
RTD + TRANS MITTER	150	l. 4	
Wiking & and my	55-	6.0	
•	_	2.0	
TERMINATIONS	205	9.4 e 30	= 282
10 MES	503	1 1 0 30	
DUCT (AUL) TEMPERATURE			
AVERAGING RTD & XMITTER	250	42	
WIRING & CONDAIT	55	6.0	
TERMINATIONS		2.0	
TOTALS	305	13.2 630	= 396
الله المنظمية المنظمية المنظمية المنظمية المنظمية المنظمية المنظمية المنظمية المنظمية المنظمية المنظمية المنظم المنظمة المنظمية المنظمية المنظمية المنظمية المنظمية المنظمية المنظمية المنظمية المنظمية المنظمية المنظمية الم			
LIQUID TEMPERATURE	200	1.5	
RTD + TRANSMITTER	85	4.5	
THERMONELL		6.0	
WIRING + CONDUIT			
TERMINATIONS	340	2.0 14.0 630	< 840 H
TOTALS		1710 - 50	810
SPACE OA RELATIVE HUMIDITY			
RH SENSOR & X MITTER	-550	1.4	
WIRING & CONDAIT		6.0	
TERMINATIONS		2.0	
TOTALS	605	9.4 e 30	· 282
	<u> </u>		
GANGE PRESSURE, LIGHID			
PRESSURE TRANSMITTER	525	2,4	
TAP	45_	3.0	
Williamy & WHONIT	- 55	6.0	
TERMINATIONS		14.2 e 30	- 476
TOTALS	625	17.6 - 30	7.0
			5
I LABOR HOWRS BASED ON HADSP-	88- LO7-ED	- INS LAKES	emcs wst

Keller & Gannon

COMPUTED BY RCL	EMUS KEASIBILITY	PROJECT_ 16-403-10
DATE MARCH, 1993		
REV19		SHEET NO. 30 OF 34 SHEETS

	* ***********	•		
MALOG INPATS (CONT'D)	MAT'L LIST	LABOR MH	LABOR COST	
DIFFERENTIAL PRESSURE, LIGHD	من مدن المسالمة الم	**		
D. P. TRANSMITTER	750	5.0	to the second second second	
PROSSURE TAPS (2)	90	6.0	11 TT 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
WIRING & CHOMT		, -	The second of th	
TERMINATIONS		6.0		
·		2.0 19.0 e 3		
TOTALS	895	17.06 5	6 - 5 /6 	
FLOW, LIGHID	÷		.	-
D.P. (FLOW) XMITTER	850	5.0		
AVERAGING PITOT TURK	250	3.0		
WIRING + COMONIT		6.0		
TERMINATIONS		2.6		
TOTALS	1,155	16.0 e 3	480-	
DAMPER/VALUE POSITION				
POTENTOMETER	170	2.5	1 And I will be a second or second o	
TRANSONUER	90	0.4	114 11 wheeler whom	
WIRING & COMONIT		6:0		
TERMINATIONS		2.8	The first term to the second second second	
TOTALS	315	10.9 e 30	- 317	1.
ELECTRIC POWER !!				
WATT TRANSDINGER	525	6,9		
WIRING & COMONIT		6.0		111
TELMINATIONS		2.0		
707ALS	580	8.4 6 3	· ~ 767	
			- 001	
		7		
Existing Cts + PT's				
		·		
				1 1 1 1 1

Keller & Gannon

HECKED BY MARCH 1993	OMPUTED BY RUL EMCS FEAS	BILITY	PROJECT	16-403-10
DIGITAL INPUTS PRISSING SWITCH, LIQUID GINGS PRESSING SWITCH PRESSING TOP UIRING & CONDUIT TERMINATIONS TOTALS DIFFERENTIAL PRESS. SWITCH, AIR AIR D.P. SWITCH, AIR MIR D.P. SWITCH WIRING & CONDUIT TERMINATIONS TOTALS AUXILIARY CONTRET TERMINATIONS TOTALS ANALOG ONTPUTS CONTROL POINT ADDISTMENT CPA CONTROLER, PNEAMATIC 160 1.8 MP CONTROLER PNEAMATIC 160 1.8 MP CONTROLER, PNEAMATIC 160 1.8 MP CONTROLER PNEAMATIC 160 1.8 MP CONTROLER PNEAMATIC 150 1.0 EP VALUE 230 1.0 PRESSING REGISTATION 30 0.4 WIRING & CONDUIT 55 6.0 TERMINATIONS 20 1.0 PRESSING REGISTATION 30 0.4 WIRING & CONDUIT 55 6.0 TERMINATIONS				0.21 05.24 0155
PRISSING SWITCH, LIQUID GINGS PROSSING SWITCH PROSSING TOP WIRING & CONDUIT TOTALS DIFFERENTIAL PROSS. SWITCH, AIR AIR D.P. SWITCH WIRING & CONDUIT TERMINATIONS TOTALS TOTALS 145 9.9 230 = 417 DIFFERENTIAL PROSS. SWITCH, AIR AIR D.P. SWITCH WIRING & CONDUIT TERMINATIONS TOTALS 145 9.9 230 = 297 ANXILIARY CONTACT TERMINAL STRIP WIRING & CONDUIT TERMINAL STRIP WIRING & CONTACT TERMINAL STRIP WIRING & CONTACT TOTALS ANALOG OUTPUTS CONTACL POINT ACTIVEMENT CPA CONTROLLER, PNOWMATIC 160 1.8 T/P CONTACL RELAY 20 1.0 PRESSUME REGINATOR 30 0.9 WIRING & CONDUIT TERMINATIONS — 20 WIRING & CONDUIT TERMINATIONS — 20	EV 19		SHEET N	0. 31 Or 37 SHEET
PRISSING SWITCH, LIQUID GINGS PROSSING SWITCH PROSSING TOP WIRING & CONDUIT TOTALS DIFFERENTIAL PROSS. SWITCH, AIR AIR D.P. SWITCH WIRING & CONDUIT TERMINATIONS TOTALS TOTALS 145 9.9 230 = 417 DIFFERENTIAL PROSS. SWITCH, AIR AIR D.P. SWITCH WIRING & CONDUIT TERMINATIONS TOTALS 145 9.9 230 = 297 ANXILIARY CONTACT TERMINAL STRIP WIRING & CONDUIT TERMINAL STRIP WIRING & CONTACT TERMINAL STRIP WIRING & CONTACT TOTALS ANALOG OUTPUTS CONTACL POINT ACTIVEMENT CPA CONTROLLER, PNOWMATIC 160 1.8 T/P CONTACL RELAY 20 1.0 PRESSUME REGINATOR 30 0.9 WIRING & CONDUIT TERMINATIONS — 20 WIRING & CONDUIT TERMINATIONS — 20		1 . h \ 1 . t	1.40.0	
GNNAS PRASSONAE SWITCH PRESSONAE TAP WIRING T COMDINIT TERMINATIONS TOTALS DIRFERIANTIAL PRESS. SWITCH, AIR AIR D. P. SWITCH, AIR WIRING T COMONIT TERMINATIONS TOTALS DIRFERIANTIAL PRESS. SWITCH, AIR AIR D. P. SWITCH, AIR AIR D. P. SWITCH WIRING T COMONIT TERMINATIONS TOTALS TOTALS TOTALS TERMINATIONS TOTALS ANALOG OUTPUTS CONTROL POINT ADJINIMENT CPA CONTROLER, PNEMMATIC 1600 1.8 T/P CONTROLER, PNEMMATIC 160 1.8 T/P CONTROL		MAT'L WSI	LABOY MH	LABAR COST
PRESSURE TAP WIRING & CANDUIT TERMINATIONS TOTALS DIFFERENTIAL PRESS. SWITCH, AIR AIR D.P. SWITCH WIRING & COMONIT TERMINATIONS TOTALS AUXILIARY CONTACT TERMINATIONS TOTALS ANALOG DATPATS CONTROL POINT ADJUSTMENT CPA CONTROL POINT ADJUSTMENT CPA CONTROL RELAY EP VALUE PRESSURE REGULATOR TERMINATIONS 2.0 1.5 4.5 4.5 4.5 1.6 1.8 1.9 1.9 1.8 1.9 1.0 1.8 1.9 1.0 1.0 1.0 1.0 1.0 1.0 1.0				
WIRING & CONDUIT				
TERMINATIONS TOTALS TOTALS DIFFERENTIAL PRESS. SWITCH, AIR AIR D. P. SWITCH WIRING & CONOMIT TERMINATIONS TOTALS AUXILIARY CONTACT TERMINAL STRIP WIRING & CANOMIT TERMINATIONS TOTALS ANALOG OUTPUTS CONTROL POINT ADDISTMENT CPA CONTROLER, PNEUMATIC 160 1.8 TO CONTROL RELAY EP VALUE PRESSURE REGULATOR TERMINATIONS PRESSURE REGULATOR TERMINATIONS	Priessure TAP		-	
TOTALS DIFFERENTIAL PRESS. SWITCH, AIR AIR D. P. SWITCH WIRING 4 COMOUNT TERMINATIONS TOTALS 145 AUXILIARY CONTACT TERMINAL STRIP WIRING 4 COMOUNT TERMINATIONS TOTALS ANALOG OUTPUTS CONTACL POINT ADJUSTMENT CPA CONTACLER, PNEAMATIC LIP CONTACLER PRESSURE REGULATOR 30 1.8 LIP CONTACL PLAN EP VALUE PRESSURE REGULATOR 30 0.9 WIRING 4 CONDOUTT 55 60 TERMINATIONS	Wiring + CONDUIT	35	6.0	
DIFFERENTIAL PRESS. SWITCH, AIR AIR D. P. SWITCH WIRING 4 CONDUIT TERMINATIONS TOTALS 145 4.9 4.9 4.9 4.9 4.9 4.9 4.9 4	TERMINATIONS		2.0	
ANR D. P. SWITCH WIRING 4 COMONIT TERMINATIONS TOTALS 145 9.9 830 = 297 AUXILIARY CONTACT TERMINAL STRIP WIRING 4 COMONIT TERMINATIONS TOTALS ANALOG ONTPINTS CONTROL POINT ADJISTMENT CPA CONTROLER, PNEAMATIC 160 1.8 1/P CONVERTER 230 1.0 EP VALUE PRESSURE REGULATOR TERMINATIONS — 20 PRESSURE REGULATOR TERMINATIONS — 20 LERMINATIONS — 20	TOTALS	250	13.9 3'30	0 = 417
ANR D. P. SWITCH WIRING 4 COMONIT TERMINATIONS TOTALS 145 9.9 830 = 297 AUXILIARY CONTACT TERMINAL STRIP WIRING 4 COMONIT TERMINATIONS TOTALS ANALOG ONTPINTS CONTROL POINT ADJISTMENT CPA CONTROLER, PNEAMATIC 160 1.8 1/P CONVERTER 230 1.0 EP VALUE PRESSURE REGULATOR TERMINATIONS — 20 PRESSURE REGULATOR TERMINATIONS — 20 LERMINATIONS — 20	Date Control Are			
WIRING 4 COMOUNT SS 6.0 TERMINATIONS - 2.0 TOTALS 145 9.9 e 30 = 297 AUXILIARY CONTACT TERMINAL STRIP 30 1.5 WIRING 4 CONDUIT SS 6.0 TERMINATIONS - 2.0 TOTALS 85 9.5 e 30 = 285 ANALOG ONTPUTS CONTROL POINT ADJUSTMENT 160 1.8 LIP CONVERTER 250 1.0 CONTROL RELAT 35 1.0 EP VALUE 230 1.0 PRESSURE REGULATOR 30 0.9 WIRING 4 CONDUIT 55 6.0 TERMINATIONS - 2.0		g _n	1.9	
TERMINATIONS TOTALS 145 9.9 230 = 297 AUXILIARY CONTACT TERMINAL STRIP WIRING 4 CONDUIT TERMINATIONS TOTALS ANALOG OUTPUTS CONTROL POINT ADJUSTMENT CPA CONTROLLER PNEUMATIC 160 1.8 I/P CONVERTER CONTROL RELET EP VALUE PRESSURE REGULATOR 30 1.0 PRESSURE REGULATOR 30 0.9 WIRING 4 CONDUIT 55 6.0 TERMINATIONS — 2.0		10	·	
TOTALS 145 9.9 230 = 297 ANXILIARY CONTACT TERMINAL STRIP WIRING 4 CANDAIT TERMINATIONS TOTALS 85 9.5 285 ANALOG ONTPATS CONTROL POINT ADJINSTMENT CPA CONTROLLER, PREVAMATIC 160 1.8 T/P CONTROLLER, PREVAMATIC 150 1.0 EP VALUE EP VALUE 230 1.0 EP VALUE 1860LATOR VIRING 4 CONDAIT 55 6.0 TERMINATIONS - 20	·	33	70	era e e e e e e e e e e e e e e e e e e
ANXILIARY CONTACT TERMINAL STRIP WIRING 4 CANDINT TERMINATIONS TOTALS ANALOG ONTPATS CONTROL POINT ADJINSTMENT CPA CONTROLER, PNEUMATIC 160 1.8 T/P CONVERTER CONTROL RELAY EP VALVE PRESSURE REGILATOR WIRING 4 CONDUIT SS 6.0 TERMINATIONS - 2.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0		145	9.9 82	o = 297 · · ·
TERMINAL STRIP WIRING 4 CONDAIT TERMINATIONS TOTALS ANALOG DATPATS CONTROL POINT ADJUSTMENT CPA CONTROLLER, PHENMATIC 160 1.8 T/P CONVERTER CONTROL RELAT EP VALUE PRESCURE REGULATOR JERMINATIONS TERMINATIONS - 2.0 TERMINATIONS - 2.0	TOTALS	1.12	111 - 2	
TERMINAL STRIP WIRING 4 CONDAIT TERMINATIONS TOTALS ANALOG DATPATS CONTROL POINT ADJUSTMENT CPA CONTROLER, PREMARTIC 160 1.8 T/P CONVERTER CONTROL RELAT EP VALUE PRESCURE REGULATOR JERMINATIONS TERMINATIONS 1.5 6.0 1.5 6.0 1.5 6.0 1.5 6.0 1.5 1.5 1.5 1.6 1.6 1.7 1.7 1.8 1.8 1.0 1.8 1.0 1.8 1.0 1.8 1.0 1.8 1.0 1.0			in the second se	
WIRING & CONDAIT TERMINATIONS TOTALS AMALOG ONTPATS CONTROL POINT ADJUSTMENT CPA CONTROLLER, PNEUMATIC 160 1.8 T/P CONVERTER CONTROL RELAT EP VALUE PRESSURE REGULATOR WIRING & CONDAIT TERMINATIONS - 20	AUXILIARY CONTACT			
TERMINATIONS — 2.0 TOTALS 85 9.5 e 30 = 285 ANALOG ONTPHTS CONTROL POINT ADJUSTMENT CPA CONTROLLER PHENMATIC 160 1.8 T/P CONVERTER 250 1.0 CONTROL RELAT 35 1.0 EP VALUE 230 1.0 PRESSURE REGULATOR 30 0.9 WIRING & CONDUIT 55 6.0 TERMINATIONS — 2.0	TERMINAL STRIP	30	1-5	
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Engineers-Architects

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FORM 101-1/8

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COMPUTATION SHEET

Engineers-Architects

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FORM 101-1/8

Life Cycle Cost Analysis Summary Energy Conservation Investment Program (ECIP)

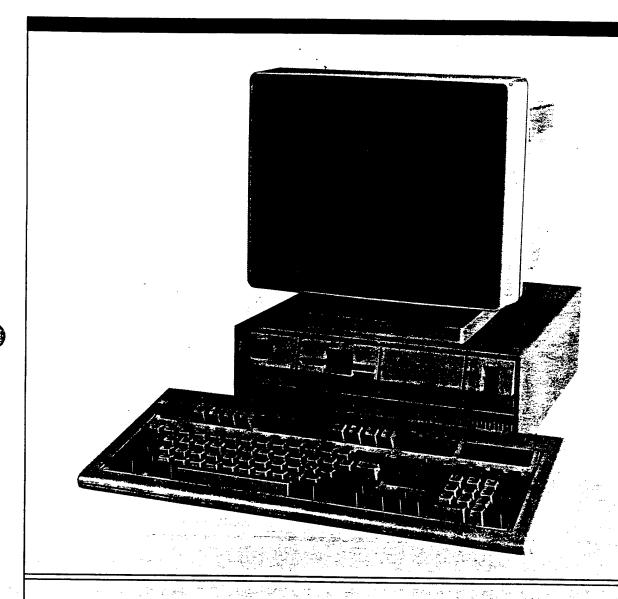
ECO D-10 Sheet **34** of **34** -

	Fort broken i is	act California	Region No. 4			Project No. 16	-403- 10
Location: Project Title	Fort Hunter Lig	gett, Camornia	region no. +			Fiscal Year F	
	: EMOS rtion Name: ECO≉	¥D-10					
	te: March 1993		Economic Life:	15 YE/	NAS	Preparer: KELI	ER & GANNON
Arialysis Da	te. March 1900						
1. investme			40.400.000				
A. Construc	tion Costs		\$2,100,000	-			
B. SIOH			\$115,500	-			
C. Design C			\$126,000				
	st (1A+1B+1C)		\$2,341,500		\$ 0 -		
	Value of Existing E				(\$12,065)		
	ility Company Reb				(#12,000)	\$ 2,329,435	i
G. Total Inv	estment (1D-1E-1F	7)				4 2,020, 100	•
2. Energy S	avings (+)/Cost(-)	: d for Discount Facto	irs	-			
Date of No	11h 05-32/3-A Use	d 101 Discoult 1 dott					
Energy	Cost	Saving	Annual \$		count	Discounted	
Source	\$/MTBU/(1)	MBTU/YR(2)	Savings(3)	Fac	tor(4)	Savings(5)	
A 5100	\$21.84	1,841.0	\$40,207		11.70	\$47 0,427	
A. Elec.	\$4.98	2,460.0	\$12,251		13.78	\$168,816	-
B. Dist	\$7.87	3,399.0	- \$26,750		14.16	\$378,782	
C. Propane D. Demand	\$108.6	112	kw = \$12,128		11.70	\$141,896	
E. Other	4100.0	- 	=,			•	
F. Total			\$91,336	. —		\$1,159,921	
3. Non Ener	gy Savings (+) or	Cost (-):		•			
A. Annual R	ecurring (+/-)		(\$5,200)	_			
	t Factor (Table A)	•			11.12	_	
	ted Savings/Cost (3A x 3A1)				(\$57,824)	
	-						
B. Non Rec	urring Savings (+)	or Cost (-)					
item	Savings(+)	Year of	Discount	Dos	counted Sav	.	
1.0	Cost(-)(1)	Occur. (2)	Factor(3)	ing	s(+)Cost(-)(4))	
				_			
a. *				.—		-	
b. 🕫		_				-	* * *
C. 1.				_		.	e e e e e e e e e e e e e e e e e e e
d. Total							
C Total Nor	Energy Discounte	ed Savings (3A2+3E	id 4)		(\$57,824)		
4 6		A + /2Dd1 /Economic	a Lifa\)·		27.0	Years	•
		3A+(3Bd1/Economic	. Lite)).		\$1,102,097		
	Discounted Saving				0.47		
6. Savings t	o Investment Ratio	(SIM) 5/14:	•		V.47	•	

7. Adjusted Internal Rate of Return (AIRR):



MOSCAD Motorola SCADA IGC/M Supervisory Control Center



The MOSCAD system Supervisory Control Central (IGC/M) will provide necessary central stations functions in a MOSCAD Supervisory Control and Data Acquisition (SCADA) system. When connected to the appropriate Front End Processor, the IGC/M is capable of monitoring and controlling MOSCAD remote terminal units via either conventional or trunked two-way radio, microwave backbone, or (with appropriate interface) multi-drop wire or fiber optic communications media. The video display offers high quality color presentations of alarm and of system status and telemetry conditions using either character or pixel graphics and alphanumeric text.

The IGC/M central may consist of a single computer that provides system information to a single operator.

Or several computers may be configured in a Local Area Network (LAN) to pass/share system data among several operators.

The industry standard IGC/M central software is a menu-driver database package that is completely user definable. Built-in prompts and help screens support definition of graphic displays, data calculations, automatic control sequences, text messages, and reports. Selected events and system activities are automatically logged to the system printer and hard drive for future suse. The multi-tasking capability of the software allows you to add-to or modify your system database while the central continues to perform its monitoring and control functions.

MOSCAD System IGC/M Central

Feature/Benefit

Industry Standard SCADA Software—The IGC/M software package, based on THE FIX/DMACsTM SCADA software, provides a powerful data acquisition, control, and display package that can be easily tailored to match your system needs.

Supports a comprehensive package of data acquisition and control functions plus man-machine interface (MMI) that are normally found only on large expensive computer based systems.

Standard IBM PC Computer—The IGC/M software runs on an IBMTM PS/2 386-type computer, mixing easy operator interface with the flexibility to handle the full capability of the MOSCAD remote terminal unit.

Allows the system operator(s) to efficiently monitor and control multiple MOSCAD remote terminal units via conventional or trunked radio, microwave baseband, or multidrop (leased and dial-up) wire or fiber optic communications media.

High Resolution Color Character or Pixel Graphics Display—An IBM PS/2 color display, along with either the standard 128 symbol ISA instrumentation character set or pixel graphics allows construction of dynamic visual displays that can represent any system operation.

Allows you to build highly detailed color graphic screens that can visually alert your operators to changing system conditions. This type of visual information can enable them to react quickly with great accuracy to system problems.

Multi-Tasking Capability—The IGC/M can run, under standard IBM PC DOS, foreground and multiple background tasks.

Allows operators to edit the system data base or print special reports while the central is performing its normal monitor and control functions.

Data Acquisition—The IGC/M can monitor and report on the condition of multiple digital, counter, and analog inputs from each of the MOSCAD remote terminal units in the system.

Allows the reporting of digital alarm or status changes, such as intrusion/fire alarms and pump runtimes, and the values of analog inputs or calculated data, such as motor speed, fluid levels and flows, and statistical averages.

Supervisory Control Outputs—The IGC/M can manually or automatically (by schedule or event) generate digital or analog control outputs to a MOSCAD remote terminal unit.

Provides for the direct control of electrical devices, such as motors, pumps, valves, emergency sirens, or tower lights. Also, allows you to proportionally control valves and vary the speed of fans or motors to change remote operating conditions.

System Printers—A printer may be connected to each IGC/M to record selected system alarms, status changes, and control actions. Add a second printer, either locally or remotely, for system reports.

Allows you to keep a printed log of selected system transactions while simultaneously printing system reports.

Secure Signalling—All IGC/M messages are transmitted using MDLC, a 7-layer OSI packet-type signalling format that was specifically developed to handle large amounts of data on two-way radio communication channels.

Ensures accurate and reliable operation with no false or erroneous controls, even during conditions with a high level of noise.

Contention or Polling—The IGC/M receives and displays status and analog value changes sent in autonomously from MOSCAD remote terminal units (contention) and/or in response to an interrogation (poll) generated by the IGC/M.

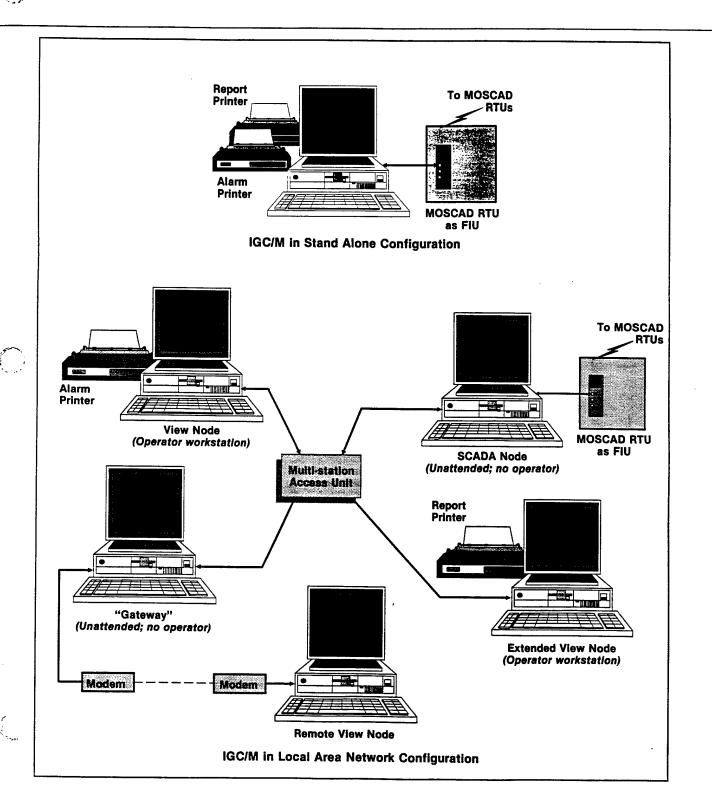
Contention reporting provides the IGC/M with fast screen updates of alarm or changes in monitored analog values. Polling ensures the timely update of the IGC/M's data base and detection of potential remote terminal unit failures.

Automatic Data Base Preparation—Significantly reduces the time required to make the IGC/M operational by integrating each MOSCAD RTU's data base into the central.

Preparing the display screens and linking dynamic display elements to the data base is all that remains.

Broadcast Capability—Commands and messages may be sent to groups of RTUs. The groupings may be changed dynamically.

Multiple RTUs will respond to a single broadcast transmission to simultaneously control multiple devices at multiple sites. The groupings need not be predefined during system design.



MOSCAD System IGC/M Central

Specifications

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Hardware: Computer: Software: Display Formats:	IBM PS/2 386-type (such as Model 55SX) computer with a 4 Mbyte RAM, one 60 Mbyte hard disk, one 3.5" high density floppy disk drive, math coprocessor, 2 serial and 2 parallel ports, mouse, and a 12" VGA color display. Alarm & report printers as needed. (LAN hardware required in network configuration). THE FIX/DMACS with MOSCAD driver. DOS V3.3 and QEMM386 included. Character Graphics: 80 columns by 25 lines; 16 colors Pixel Graphics: 640 x 350 pixels (EGA mode) or 640 x 480 pixels (VGA mode); 16 colors Use an appropriate MOSCAD RTU model.
I/O Capability: Control Modes: Interrogation Modes:	256 RTUs with 3000 total I/Os (total I/Os per Stand-alone or SCADA node.) Manual control; automatic loop control Manual, event triggered, and scheduled. Rates adjustable from 1 second to several days in 1 second increments in multiple schedules or at predetermined dates, days and times.
Node Type: Stand Alone: L.A.N.:	SCADA and VIEW, RTU interface with pixel graphics, historical trending, report generation, scheduler capability, and alarm handling. SCADA node: RTU interface with pixel graphics and scheduler capability. View node: pixel graphics and alarm handling. Extended View node: pixel graphics, historical trending, report generation, scheduler capability, and alarm handling. Maximum number of nodes: 16.
General: Power: Temperature:	117 Vac 60 Hz (800 VA per node); 230 Vac 50 Hz available Operating: +15 to +32 °C; 8 to 80% relative humidity, non-condensing







Support Services

Support services

Wherever Motorola sells, our product is backed by service, in the U.S., we have 900 authorized or companyowned centers. In addition, our products are serviced throughout the world by a wide network of company or authorized independent distributor service organizations.



MOTOROLA

1301 E. Algonquin Road. Schaumburg, Illinois 60196 Telephone toll-free 1-800-247-2346 In Canada: 4000 Victoria Park Avenue North York, Ontario M2H3P4 Telephone: (416) 499-1441

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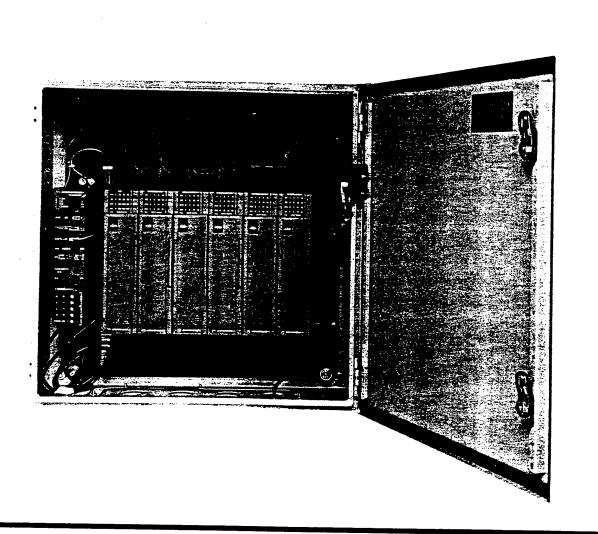
The FIX/DMACS is a trademark of Intellution, Inc.

R3-11-79

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MOSCAD Motorola SCADA Remote Terminal Unit



Product Overview

The MOSCAD Remote Terminal Unit (RTU) provides a data collection unit with the intelligence required to operate in sophisticated Supervisory Control And Data Acquisition (SCADA) data systems. With MOSCAD, local processes can be thoroughly supervised; control decisions, utilizing data from both local and remote sources, can be made; informational messages to supervisory centrals or to other remote units can occur. MOSCAD utilizes reliable Motorola FM two-way radio as the message transmission medium to completely eliminate dependence on leased wireline networks.

MOSCAD can automatically make the control decisions required to manage the local process—no instructions or intervention by external supervisory equipment is required. These control, and other, actions are defined within MOSCAD in an advanced ladder-language format; the SCADA Application Development software program is available to assist in this effort. MOSCAD uses the MDLC communications protocol, which was specifically designed to transmit large amounts of data via FM two-way radio, when communications with supervisory or other remote units is required.

MOSCAD, Motorola SCADA, Remote Terminal Unit

Feature/Benefits

Local Intelligence—MOSCAD is a microprocessor based RTU with large memory capacity that can locally make control decisions based on status conditions and values from local and remote sources.

Local intelligence permits control decisions without the need for real-time messages from other supervisory centers; MOSCAD can operate in sophisticated control systems.

Ladder Logic—MOSCAD uses an advanced symbolic *ladder-logic application language* to develop the data base conditions, values, and RTU profile that must exist for each control action, message transmission, etc. to occur.

Powerful applications may easily be defined using industry accepted ladder logic. The task is made easier by using the SCADA Application Development software and an IBM PC computer.

MDLC—MOSCAD uses the MDLC communication protocol for all data signalling.

Specifically developed for two-way radio use but completely applicable to wireline, microwave, and fiber optic media, MDLC permits large volumes of data to be quickly transferred between terminals using packet transmission techniques.

Upload/Download—MOSCAD, via the MDLC data transfer capability, uploads the data collected and calculated by the application program to a central site and receives downloaded changes in the application program and in the parameters that control how the application operates.

The process being supervised need not be static; operational variables and limits, and the process definition itself, can be easily changed and transmitted to the RTU. Site visits by maintenance personnel are not required.

Diagnostics—MOSCAD incorporates self-diagnostic software routines to help maintenance personnel identify and correct operational problems. The ladder-logic application itself can log operational problems and transmit that data to a supervisory terminal using MDLC.

Self diagnostics and error reporting capabilities, plus local LEDs, permit maintenance personnel to repair malfunctions in the shortest possible time.

Communications—MOSCAD permits communications to occur RTU-to-central and RTU-to-RTU. Communications may occur between individual units or may be "broadcast" to several units simultaneously.

Communications between any or all units in the system may occur.

Modular—The core capabilities of MOSCAD are present in the CPU module. Other modules provide digital and analog input and output capabilities. Each module provides LED indicators that monitor the operations of the module.

Modular construction permits configuring each RTU to meet the precise requirements of each application, and permits future expansion as the application expands. Maintenance personnel need only to replace modules to restore proper operations.

CPU Module—The CPU module contains the microprocessor and associated RAM/ROM to control the connected I/O modules, the radio, and the communication ports.

All core functions, including system, application, and communication software, are contained in this module.

I/O Modules—Digital and analog input, digital and analog output, and combination input/output modules are available for those on-site inputs and outputs.

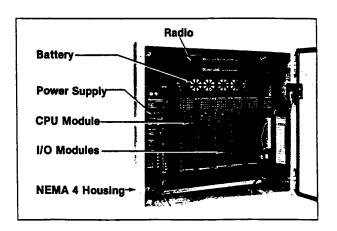
The digital input module includes high-speed counter capability. The relays on the digital output module provide either momentary or latch operation.

RS232/RS485 Ports—Connectors on the CPU module permit the connection of a terminal for application programming, a second terminal or printer for local operator I/O, and the radio.

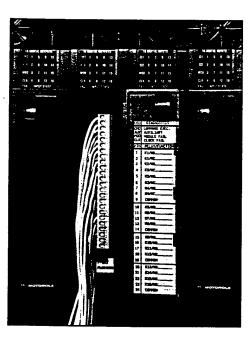
Multiple connectors, multiple communication protocols, and variable data speeds allow practically all external Data Terminal Equipment (DTE) to be connected to the CPU module.

Dual Power Supply—MOSCAD is available with dual power supplies: a battery capable of fully powering the RTU, and an ac operated power supply that also recharges the battery.

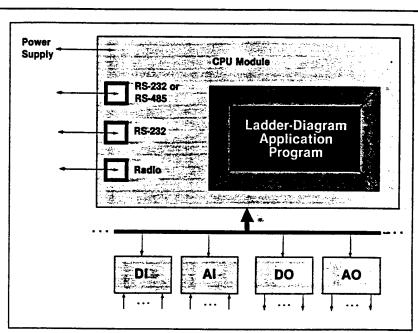
Dual power sources insure continuing operation during ac power failures.



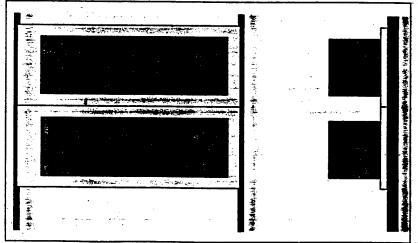
The CPU Module controls all operations



Rack-mount with space for 15 I/O modules



Plug-in I/O module showing LEDs and user connector



MOSCAD, Motorola SCADA, Remote Terminal Unit

Specifications NEMA-4 steel enclosure (1-6 modules): $19.7" \times 19.7" \times 8.3"$ Physical: General Rack mount (1-8 modules); 19" × 10.5" Dual: provides 13.8 Vdc @ 7A from 120/240 Vac 50/60 Hz; 13.8 Vdc 5 A-h battery Power Supply: -30 to +60°C; 96% RH @ +50°C **Environmental:** Maximum 248 modules in racks of 16 (additional power supplies required) Expansion: 68302 (16/32 bit); CMOS; 16.6 MHz clock **CPU Module** Processor: († special order only; 2.5 Mbyte max.) 256k (2 Mybte †) EPROM, 64k (256k †) RAM, 128k (512k †) FLASH Memory: -RS232 at up to 9600 baud -RS232 at up to 9600 baud -Radio: 600-4800 baud, direct-FM, half/full duplex, synchronous, MDLC communication protocol LED on/off/test; alarm acknowledge **Pushbuttons:** Provides 5 Vdc @ 2 A to expansion modules; Consumes 120 ma @ 12 Vdc Power: 16 digital inputs (500 Hz) plus 2 counter inputs (10 kHz rate; 50 µsec min pulse width); up to 14 ga. wire Di Module Inputs: 1-32 msec in hardware, longer by application program Filtering: 2.5 kV; opto-isolation; on-board dc/dc converter Isolation: Per IEEE SWC 472/585 (600V discharge) Protection: Consumes 5 Vdc @ 15 ma, 12 Vdc @ 15-60 ma Power: Type 1: 16 momentary or magnetic-latch; Type 2: 8 momentary or magnetic-latch **DO Module** Relays: Type 1: 12 Form A, 4 Form C; Type 2: 8 Form C 60VA rating, not to exceed 250V or 2A; up to 14 ga. wire Configuration: Contact Rating: 1 kV between contacts, 1.5 kV contact-to-coil isolation: Per IEEE SWC 472/585 (600V discharge) Protection: Consumes 12 Vdc @ 15-300 ma Power: Eight: 4-20 ma into 250Ω ; ± 1 ma into $4 k\Omega$; $\pm 1 V$ or $\pm 5 V$ into $10 k\Omega$; up to 14 ga. wire Al Module inputs: 13 bit; ±0.05% FS plus 30 ppm/ ℃ Accuracy: Conversion: 2 msec per input 2.5 kV (optical) input-to-ground, 200 V peak between inputs Isolation: Protection: Per IEEE SWC 472 Consumes 5 Vdc @ 20 ma, 12 Vdc @ 15-60 ma Power: Four: 4 - 20 ma into 250 Ω load from internal power source, into 750 Ω from external 24 Vdc power source; AO Module Outputs: 0-5 V into 1k Ω minimum load. Up to 14 ga, wire, 2.5 kV optical isolation provided. 12 bit; ± 0.1% FS plus 30 ppm/ ℃ Accuracy: Mixed I/O Module 8 digital inputs (may be used as counters)-see DI Module for performance specs. Inputs: 2 analog inputs; 4 – 20 ma only; 250 Ω input impedance; 10 bit, \pm 0.5% FS plus 30 ppm/ $^{\circ}$ C 4 momentary or magnetic-latch: 2 Form A, 2 Form C-see DO Module for performance specs **Outputs:**

Processes: Elements: **Element Types:** 1 - 8 running simultaneously

12,000 with 128k FLASH memory (50,000 with 512k FLASH memory)

Inputs

Logic (N.O., N.C., value) Comparator $(=, \neq, >, <)$ Counters (up, down)

Arithmetic (+, -, x, + Boolean (AND, OR, XOR)

Outputs Relay (open, close)

Timer (delay on, delay off, retentive) Binary - BCD conversion Variable - variable conversion

Text Jump Call - Return

Scan Shift (logic & arithmetic; left, right)

Ladder Logic

'CC intormation						
Frequency Range	Model Number	Radio Type	Power Out	Rules Part	Emission Designators	Type Acceptance
136-174 MHz	F6973	MAXTRAC	20 watt	90 ⊕	15K0F2D, 16K0F1D, 16K0F3E	ABZ9QCT3733 🦈
403-430. 450-470 MHz	F6974	MAXTRAC	20 watt	90	15K0F2D, 16K0F1D, 16K0F3E	ABZ9QCT460125
806-869 MHz Trunked	F6985	MAXTRAC	15 watt	15, 90 -	15K0F2D, 16K0F1D, 16K0F3E	ABZ9QCT5653 %
928-960 MHz (12.5 kHz)	F6956	DARCOM 9000	5 watt	94 ≅	12K5F2D, 12K5F3E, 12K5F9W	ABZ9QCC6612.2
192-960 MHz (25 kHz)	F6956	DARCOM 9000	5 watt	94 🕬	16K0F2D, 16K0F3E, 16K0F9W	ABZ9QCC8608 %:
External radio (FSK)	F6909	External	Note 1	Note 1	Note 1	Note *
External modem	F6900	None	None -	N/A 398	N/A %	N/A m

Note 1: Determined by External Radio Model





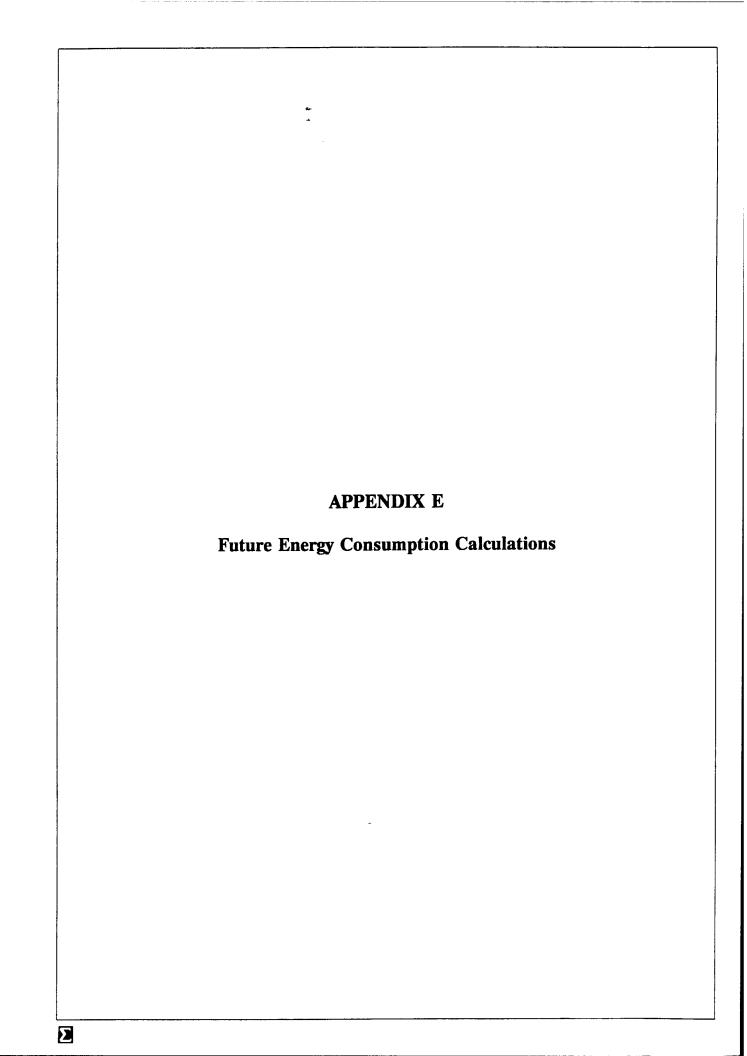


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EEAP, Limited Energy Study Fort Hunter-Liggett, California

APPENDIX E

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TABLES

E-1	Summary	Future	Energy	Use
1.7-1	Omitmiter A	1 uluiv		

- E-2
- Summary Future HVAC and DHW Energy Use Summary Future Lighting and Process Energy Use E-3

Fac	Area	Total Future Energy Use			Energy Use per Floor SF		
No.	(SF)	Fuel Oil	Propane	Electric	Total	Total	
		Mil BTU/Yr	Mil BTU/Yr	kW-Hr/Yr	Mil BTU/Yr	k BTU/SF-Yr	
T 6	1,090		74	13,121	119	109.1	
P 41A	1,397		58	21,055	129	92.6	
P 41B	1,937	•	43	10,130	78	40.1	
P 42A	1,937		60	22,824	138	71.1	
P 42B	1,937		43	10,130	78	40.1	
P 43A	1,937		60	22,824	138	71.1	
P 43B	1,937		43	10,130	78	40.1	
P 44A	1,937		60	22,824	138	71.1	
P 44B	1,937		43	10,130	78	40.1	
P 45A	1,937		60	22,824	138	71.1	
P 45B	1,937		43	10,130	78	40.1	
P 46	2,089		54	18,188	116	55.8	
P 47	2,089		54	18,188	116	55.8	
P 51A	1,937		60	22,824	138	71.1	
P 51B	1,937	}	43	10,130	78	40.1	
P 52A	1,937		60	22,824	138	71.1	
P 52B	1,937		43	10,130	78	40.1	
P 53	2,089		54	18,188	116	55.7	
P 54	2,089	-	54	18,188	116	55.7	
P 55	2,089		54	18,188	116	55.7	
P 56	2,089		54	18,188	116	55.7	
P 57	2,089	•	54	18,188	116	55.7	
P 58	2,089		54	18,188	116	55.7	
P 59	2,089	ł	54	18,188	116	55.7	
P 60	2,089		54	18,188	116	55.7	
S 79	1,000			4,028	14	13.7	
P 80	9,093		44	140,823	524	57.7	
P 81	6,719	:	150	38,996	283	42.1	
P 101	6,171		1,129	207,425	1,837	82.7	
	3,046						
	4,721						
	8,273						
P 116	1,126	•	35	7,153	59	33.2	
	662						
T 120	3,636		928	171,524	589	52.4	
	2,653						
	4,949						
T 121	4,952		81	79,406	353	63.2	
	628				•		
T 124	2,001		191	21,419	264	131.8	
T 127	2,250		252	7,966	279	123.9	
P 128	20,196		1,211	305,753	2,255	111.6	
T 131	998		- 69	12,570	112	111.8	
S 144	7,172		53	6,909	76	10.6	
S 146	4,042		244	8,347	272	67.3	
T 149	1,196		1.65	13,614	212	177.1	
T 156	1,753	1		11,767	40	17.8	
	497						
T 158	1,859			50	0.2	0.1	
T 161	2,250		46	13,317	92	40.8	
T 162	2,250		46	8,662	76	33.7	
T 163	2,250		46	6,013	67	29.7	

Fac Area Total Future Energy Use Energy Use	Energy Use per Floor SF		
No. (SF) Fuel Oil Propane Electric Tot	al Total		
Mil BTU/Yr Mil BTU/Yr kW-Hr/Yr Mil BTU/	Yr k BTU/SF-Yr		
164 2,250 46 9,737 8	35.3		
165 2,250 46 9,737	35.3		
166 2,250 46 6,013	57 29.7		
167 2,250 46 6,013	57 29.7		
168 6,560	1 0.1		
172 800 22	0 0.1		
177 3,599 6 30,174 10			
178 3,599 117 41,949 26			
182 3,000 22 204,002 71			
186 1,920 84 18,438 14			
190 2,720 306 44,515 45			
197 2,100 262 117,984 66	35 81.5		
6,062	64.6		
1,000	61.6		
205 35,820 1,412 326,553 2,52	27 61.7		
205A 5,161 206 765 5.76	59 344.0		
206 16,768 4,722 306,765 5,76	, 5 344.0		
207 35,820 1,675 319,685 2,76	66 67.5		
207A 5,161			
208 35,820 1,714 325,741 2,82	26 68.9		
208A 5,161			
209 3,320 82 205,360 78	33 235.9		
210 10,973 2,971 319,912 4,00	53 370.2		
211 - 1,184 36,436 1,30)8 -		
9 212 8,907 752 86,888 1,04			
2.0	30 196.0		
229 40,915 1,495 308,786 2,54	49 55.3		
229A 5,161			
230 35,820 1,662 336,971 2,8°	12 68.6		
230A 5,161	50.0		
3,755	57 52.2		
0,000	57 52.4		
, 201	25 75.0		
5 238 14,548 529 105,521 86	89 61.1		
240 3,000 38 32,302 14	48 49.5		
	41 74.1		
	40 47.0		
3,000	43 47.8		
	43 47.8		
	43 47.8 48 49.5		
5,555	68 70.6		
,	40 83.2		
P 256 5,294 340 29,380 4 P 259 13,667 860 55,735 1,00			
	55 38.8		
7,200			
S 286 3,000 57 31,224 10	63 54.5		
287 5,584 172 80,676 4	47 80.1		
	54 51.5		

TABLE E-1 SUMMARY FUTURE USE

Fac	Area	Total Future E	nergy Use		Energy Use per Floor SF		
No.	(SF)	Fuel Oil	Propane	Electric	Total	Total	
	(- · /	Mil BTÚ/Yr	Mil BTU/Yr	kW-Hr/Yr	Mil BTU/Yr	k BTU/SF-Yr	
S 290	14,856		599	187,081	1,237	83.3	
S 291	7,400		366	109,513	740	99.9	
P 295	46,593		1,619	787,968	4,309	92.5	
P 301	10,800		34	632,399	2,158	199.9	
P 642	995		86	1,002	89	89.7	
S 2201	891			1,155	4	4.4	
Bldg Totals	625,458	17,843	13,410	7,192,590	54,695	87.4	
Water Well				136,240	465		
Exterior Lighting				197,190	673		
Non-Scope SF	152,002			1,481,731	5,057	33.3	
Grand Total	777,460	17,843	13,410	9,007,751	60,890	78.3	

Fac	Area	Future HVAC	Energy Use		Future DHW B	nergy Use	
No.	(SF)	Fuel Oil	Propane	Electric	Fuel Oil	Propane	Electric
		Mil BTU/Yr	Mil BTU/Yr	kWH/Yr	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr
T 6	1,090	0	23.9	4,972	0	39.7	0
P 41A	1,397	0	14.4	10,924	0	32.6	0
P 41B	1,937	0	0.0	0	0	32.6	0
P 42A	1,937	0	16.8	12,694	0	32.6	0
P 42B	1,937	0	0.0	0	0	32.6	0
P 43A	1,937	0	16.8	12,694	0	32.6	0
P 43B	1,937	0	0.0	0	0	32.6	0
P 44A	1,937	0	16.8	12,694	0	32.6	0
P 44B	1,937	0	0.0	0	0	32.6	0
P 45A	1,937	0	16.8	12,694	0	32.6	0
P 45B	1,937	0	0.0	0	0	32.6	0
P 46	2,089	0	11.1	7,726	0	32.8	0
P 47	2,089	0	11.1	7,726	0	32.8	0
P 51A	1,937	0	16.8	12,694	0	32.6	0
P 51B	1,937	0	0.0	0	0	32.6	0
P 52A	1,937	0	16.8	12,694	0	32.6	0
P 52B	1,937	0	0.0	0	0	32.6	0
P 53	2,089	0	11.1	7,726	0	32.6	0
P 54	2,089	0	11.1	7,726	0	32.6	0
P 55	2,089	0	11.1	7,726	0	32.6	0
P 56	2,089	0	11.1	7,726	0	32.6	0
P 57	2,089	0	11.1	7,726	0	32.6	0
P 58	2,089	0	11.1	7,726	0	32.6	0
P 59	2,089	0	11.1	7,726	0	32.6	0
P 60	2,089	0	11.1	7,726	0	32.6	0
S 79	1,000	0	0.0	1,565	0	0.0	10.010
P 80	9,093	0	43.9	4,890	0	0.0	13,813
P 81	6,719	0	150.0	9,488	0	0.0	26,931
P 101	6,171	0	490.6	(9,390) 12,941	0	88.0 18.2	0
	3,046	0	359.4 0.0	134,563		60.7	0
	4,721 8,273	0	0.0	134,503		101.8	0
P 116			35.0	. 0		0.0	826
7 110	1,126 662	0	0.0	1,550	0	0.0	0
T 120	3,636	0	429.2	11,757	0	28.0	0
1 120	2,653	0	324.2	3,459	0	149.6	0
	4,949	Ö	0.0	0,433	0	(3.4)	0
T 121	4,952	Ö	47.0	25,804	0	34.5	0
	628	ő	0.0	0	0	0.0	7,369
T 124	2,001	0	145.8	11,148	0	34.4	0
T 127	2,250	Ö	154.1	1,036	0	97.4	0
P 128	20,196	0	546.9	86,934	o	664.3	Ō
T 131	998	ő	17.4	- 4,490	0	40.8	0
S 144	7,172	ō	52.5	418	o	0.0	Ō
S 146	4,042	o	243.7	1,442	0	0.0	0
T 149	1,196	ō	109.7	6,656	0	45.2	0
T 156	1,753	o	0.0	823	0	0.0	639
	497	o	0.0	0	0	0.0	0
T 158	1,859	0	0.0	0	0	0.0	0
T 161	2,250	o	46.3	2,638	0	0.0	0
T 162	2,250	0	46.3	2,638	0	0.0	0
T 163	2,250	o	46.3	2,638	0	0.0	0

Fac	Area	Future HVAC	Energy Use		Future DHW B	Energy Use	
No.	(SF)	Fuel Oil	Propane	Electric	Fuel Oil	Propane	Electric
110.	(0.)	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr
T 164	2,250	0	46.3	2,638	0	0.0	0
T 165	2,250	o	46.3	2,638	0	0.0	0
T 166	2,250	0	46.3	2,638	0	0.0	0
T 167	2,250	0	46.3	2,638	0	0.0	0
S 168	6,560	0	0.0	0	0	0.0	0
T 172	800	0	0.0	0	0	0.0	0
P 177	3,599	0	6.1	10,869	0	0.0	0
P 178	3,599	0	63.8	12,405	0	53.0	0
S 182	3,000	0	22.0	3,121	0	0.0	3,059
S 186	1,920	0	83.7	5,480	0	0.0	0
P 190	2,720	306	0.0	36,505	0	0.0	2,056
S 197	2,100	0	262.4	16,361	0	0.0	418
	6,062	0	0.0	62,202	0	0.0	0
S 198	1,090	0	49.1	356	0	0.0	0
P 205	35,820	1,347	0.0	168,458	65	0.0	0
P 205A	5,161	0	0.0	0	0	0.0	407
P 206	16,768	3,840	0.0	108,696	882	0.0	_
		0	0.0	0	0	0.0	0
P 207	35,820	1,338	0.0	168,577	337	0.0	-
P 207A	5,161	0	0.0	160.000	0	0.0 0.0	576 0
P 208	35,820	1,339	0.0	169,882	375	0.0	629
P 208A	5,161	0	0.0 82.3	0 56,989		0.0	37,445
P 209	3,320	1 000	0.0	153,565	1,968	0.0	0:
P 210	10,973	1,003 0	1,183.5	36,436	0	0.0	0
P 211	8, 9 07		733.6	47,849	l ő	18.3	· ·
P 212 P 219	3,212	Ö	415.4	17,812	0	55.8	0
P 229	40,915	1,338	0.0	177,788	157	0.0	ō
P 229A	5,161	0	0.0	0	0	0.0	568
P 230	35,820	1,338	0.0	185,146	324	0.0	0
P 230A	5,161	0	0.0	o	0	0.0	594
S 235	3,000	0	46.4	18,805	0	0.0	0
S 236	3,000	0	46.9	18,805	0	0.0	0
S 237	3,000	0	114.9	18,805	0	0.0	0
S 238	14,548	0	494.8	31,024	0	34.4	0
	-	0	0.0	0	0	14.1	0
P 240	3,000	0	38.2	18,805	0	0.0	0
S 241	10,000	0	147.6	162,955	0	0.0	2,719
		0	0.0	0	0	0.0	0
		0	0.0	0	0	0.0	0
S 243	3,000	0	33.0	18,805	0	0.0	0
S 244	3,000	0	33.0	18,805	0	0.0	0
S 246	3,000	0	33.0	18,805	0	0.0	0
S 247	3,000	0	38.2	18,805	0	0.0	0
P 252	12,299	686	0.0	20,340	0	0.0	2,732
P 256	5,294	340	0.0	10,742	0	0.0	4,590
P 259	13,667	860	0.0	19,377	0	0.0	2,560
S 283	4,000	0	119.8	452	0	0.0	0
0.000	0.000	0	0.0	0 18,805	0 0	0.0 0.0	0
S 286	3,000	0	56.9 131.7	53,904	0	40.3	0
P 287	5,584	0	56.9	18,805	0	0.0	0
S 288	3,000	1	50.9	10,005	1	0.0	o

TABLE E-2 SUMMARY FUTURE HVAC & DHW ENERGY USE

Fac	Area	Future HVAC Energy Use			Future DHW E	Energy Use	
No.	(SF)	Fuel Oil	Propane	Electric	Fuel Oil	Propane	Electric
	• •	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr	Mil BTU/Yr	Mil BTU/Yr	kWH/Yr
S 290	14,856	0	556.4	141,463	0	42.1	0
		0	0.0	0	0	0.0	0
S 291	7,400	0	365.8	90,929	0	0.0	0
P 295	46,593	0	1,014.5	629,841	0	605.0	0
P 301	10,800	0	34.2	79,517	0	0.0	1,832
	•	0	0.0	0	0	0.0	0
		0	0.0	0	0	0.0	0
P 642	995	0	0.0	19	0	85.9	0
S 2201	891	0	0.0	349	0	0.0	0
Bldg Totals	625,458	13,735	9,988	3,364,812	4,107	3,132	109,763
Water Well							
Exterior Lighting							
Non-Scope SF	152,002	Nil	Nil	999,260	Nil	Nil	Nil
Grand Total	777,460	13,735	9,988	4,364,072	4,107	3,132	109,763

Fac	Area	Lighting	Future Proces		
No.	(SF)	Energy	Process	Cooking	Cooking & Other
	, ,	* kWH/Yr	kW-Hr/Yr	kW-Hr/Yr	Prop Mil BTU/Yr
T 6	1,090	2,250	5,900	Included	10.5
P 41A	1,397	4,230	5,900	Included	10.5
P 41B	1,937	4,230	5,900	Included	10.5
P 42A	1,937	4,230	5,900	Included	10.5
P 42B	1,937	4,230	5,900	Included	10.5
P 43A	1,937	4,230	5,900	Included	10.5
P 43B	1,937	4,230	5,900	Included	10.5
P 44A	1,937	4,230	5,900	Included	10.5
P 44B	1,937	4,230	5,900	included	10.5
P 45A	1,937	4,230	5,900	Included	10.5
P 45B	1,937	4,230	5,900	Included	10.5
P 46	2,089	4,562	5,900	included	10.5
P 47	2,089	4,562	5,900	Included	10.5
P 51A	1,937	4,230	5,900	Included	10.5
P 51B	1,937	4,230	5,900	Included	10.5
P 52A	1,937	4,230	5,900	Included	10.5
P 52B	1,937	4,230	5,900	Included	10.5
P 53	2,089	4,562	5,900	Included	10.5
P 54	2,089	4,562	5,900	Included	10.5
P 55	2,089	4,562	5,900	Included	10.5
P 56	2,089	4,562	5,900	Included	10.5
P 57	2,089	4,562	5,900	Included	10.5
P 58	2,089	4,562	5,900	Included	10.5
P 59	2,089	4,562	5,900	Included	10.5
P 60	2,089	4,562	5,900	Included	10.5
S 79	1,000	764	1,700		0.0
P 80	9,093	10,036	112,084		0.0
P 81	6,719	1,518	1,058		0.0
P 101	6,171	8,423	ا ا	39,420	0.0
	3,046	0	6,092	5,475	0.0
	4,721	o	4,000	·	0.0
	8,273	0	5,900	Included	10.5
P 116	1,126	3,170	481		0.0
	662	0	1,126		0.0
T 120	3,636	143,185	3,291		0.0
	2,653	0	2,800	6,899	0.0
	4,949	o	134	•	0.0
T 121	4,952	23,131	4,482	5,475	0.0
	628	0	13,144	,	0.0
T 124	2,001	4,370	5,900	Included	10.5
T 127	2,250	2,930	4,000		0.0
P 128	20,196	134,259	32,000	52,560	0.0
T 131	998	2,180	5,900	Included	10.5
S 144	7,172	0	6,491		0.0
S 146	4,042	5,179	1,727		0.0
T 149	1,196	1,059	5,900	Included	10.5
T 156	1,753	9,106	749		0.0
	497	0,0	450		0.0
T 158	1,859	o	50		0.0
T 161	2,250	8,643	2,036		0.0
T 162	2,250	5,063	961		0.0
T 163	2,250	3,375	NA.		0.0

Fac Area	Lighting	Future Proces	ss Energy L	Jse
No. (SF)	Energy	Process	Cooking	Cooking & Other
(5.7)	kWH/Yr	kW-Hr/Yr	_	Prop Mil BTU/Yr
T 164 2,250	5,063	2,036	<u> </u>	0.0
T 165 2,250	5,063	2,036		0.0
T 166 2,250	3,375	NA		0.0
T 167 2,250	3,375	NA.		0.0
S 168 6,560	0	178		0.0
T 172 800	o l	22	Also see E	
P 177 3,599	16,048	3,257		0.0
P 178 3,599	19,089	272	10,184	0.0
S 182 3,000	25,040	172,782	,	0.0
S 186 1,920	11,221	1,738		0.0
P 190 2,720	3,253	1,058	1,643	0.0
S 197 2,100	34,513	1,901	·	0.0
6,062	0	2,589		0.0
S 198 1,090	3,961	986		0.0
P 205 35,820	90,408	32,417		0.0
P 205A 5,161	30,192	4,671		0.0
P 206 16,768	43,023		155,046	0.0
1	0			0.0
P 207 35,820	83,669	32,000		0.0
P 207A 5,161	30,192	4,671		0.0
P 208 35,820	84,368	36,000		0.0
P 208A 5,161	30,192	4,671		0.0
P 209 3,320	5,736	6,640	98,550	0.0
P 210 10,973	126,081	37,308	2,957	0.0
P 211 -	0			0.0
P 212 8,907	33,566	5,473		0.0
P 219 3,212	25,722	2,907		0.0
P 229 40,915	84,368	11,200		0.0
P 229A 5,161	30,192	4,671		0.0
P 230 35,820	84,368	32,000		0.0
P 230A 5,161	30,192	4,671		0.0
S 235 3,000	10,783	2,715		0.0
S 236 3,000	10,783	2,715		0.0
S 237 3,000	10,783	2,715		0.0
S 238 14,548	44,905	13,166	0	0.0
D 040	10.783	16,425	U	0.0
P 240 3,000 S 241 10,000	10,783 42,129	2,715 9,050		0.0 0.0
3 241 10,000	42,129	9,030		0.0
	0			0.0
S 243 3,000	10,783	2,715		0.0
S 244 3,000	10,783	2,715		0.0
S 246 3,000	10,783	2,715		0.0
S 247 3,000	10,783	2,715		0.0
P 252 12,299	25,152	5,254		0.0
P 256 5,294	11,787	2,261		0.0
P 259 13,667	27,960	5,838		0.0
S 283 4,000	8,176	1,709		0.0
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	0			0.0
S 286 3,000	9,704	2,715		0.0
P 287 5,584	15,604	11,168		0.0
S 288 3,000	9,704	81		0.0

TABLE E-3 SUMMARY FUTURE LIGHTING & PROCESS ENERGY USE

Fac	Area	Lighting	Future Process Energy Use		Jse
No.	(SF)	Energy	Process	Cooking	Cooking & Other
		kWH/Yr	kW-Hr/Yr	kW-Hr/Yr	Prop Mil BTU/Yr
S 290	14,856	39,273	6,346		0.0
		0			0.0
S 291	7,400	15,423	3,161		0.0
P 295	46,593	112,527	45,600		0.0
P 301	10,800	46,003	9,774		0.0
		0	495,272		0.0
		0			0.0
P 642	995	983			0.0
S 2201	891	0	806		0.0
Bidg Totals	625,458	1,911,353	1,428,456	378,207	304.5
Water Well			136,240		
Exterior Lighting		197,190			
Non-Scope SF	152,002	475,935	6,536	Shop/Whs	se
Grand Total	777,460	2,584,477	1,571,232	378,207	304.5

625,458

2,108,543

1,564,696 378,207

305



PAD MOUNTED CAPACITOR ASSEMBLIES

Metal Enclosed Capacitor Assemblies Pad Mounted 5 and 15kV Class

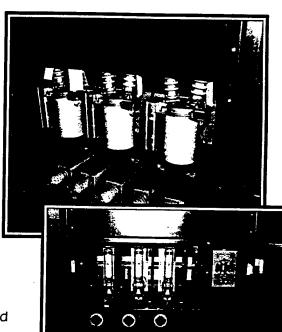
Pad Mounted Capacitor Assemblies to meet maximum kVAR requirements, while maintaining aesthetic concerns, are available from ABB. These low profile, economical units are provided for both 5kV and 15kV class applications. Pad Mounted Capacitor Assemblies will help to correct poor power factor and reduce demand on substation transformers.

General Features

Rugged 11-gauge steel, finished with two coats of baked enamel, make the enclosures sturdy, weather resistant and attractive. Available in a bolted or welded construction, these units offer front and rear door access, (dead-front) barriers, and a 3-point latching system, with means for padlocking, to insure security. Other standard enclosure features include non-corrosive hardware, ventilation, lifting provisions and a domed roof.

Typically, these assemblies are (60"H x 60"W x 60"D) and will meet a wide range of capacitor application needs. Capacitors can be standard or inverted mount to allow for oil or vacuum switching arrangements, bushings, continuous ground bus, and individual or group fusing.

Various options are available such as key interlocks, control power transformer, pentahead bolts, and custom controls. All Pad Mounted Capacitor Assemblies are designed and built in accordance with applicable ANSI, NEMA, and IEEE standards.



- Compact Design
- Economical
- Rugged Construction
- Tamper Resistant
- Available Through 2400 kVAR



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